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The Common Sense of Restoration.

DURING the last few days we have heard much talk and seen many letters about "Restoration," one of the subjects which all people think themselves competent to discuss, and about which there is at present a degree of acerbity between restorers and non-restorers which renders it a capital opening for the interchange of newspaper compliments in the off-season. In the consulship of Plancus, as many of us can remember, restoration was a venerable word, representing ideas which were supposed to sum up the whole duty of ecclesiological man; and what was man in those days if not ecclesiological? It is touching to read in the *Times* the letter of the secretary to "The Incorporated Society for Promoting the Enlargement, Building, and Repairing of Churches and Chapels," and his half admission that in the early days of the Society the money was not rightly expended; or, rather, as he puts it, not "expended as it would be now," — a naïve admission of the doctrine that whatever *is* (at the present moment) is right. But, he adds, "I do not think that the Society was to blame. It was in advance of the age. Its object was to provide additional church accommodation, and it was its misfortune, not its fault, if ecclesiastical architectural taste was at such a low level that many and many magnificent and interesting architectural features could be ruthlessly swept away to make room for the erection of a large painted deal gallery; or a very beautiful, though small, parish church could be destroyed to be supplanted by a church of the 'Gothic sort,' with cast-iron pillars painted white." That the Society accepted this sort of thing would seem to prove that it was *not* in advance of the age; but the passage recals our attention to the main object of church restoration, as practised a generation ago. That object was to supplement the revival of the Mediæval church spirit by providing buildings for increased church accommodation, and providing them in a style which was supposed to represent the proper surrounding for a revived church and ritual. Restoration of existing churches began in the same spirit. The churches had been suffered to go into decay during the period when the church was practically dead in the country, and to repair and re-beautify them was, in the first instance, simply a common-sense proceeding of a semi-practical nature. As the Mediævalising spirit gathered strength, of course the thing became more and more a matter of sentiment, and everything that savoured of the hated period before the revival, all that was antagonistic to Mediævalism, was to go. The Mediævalising of churches became a shibboleth, and there was no salvation for any one who remained lukewarm on such a matter.

The anti-restorationists are now having their innings; and bigotry and prejudice on the one side are being answered by stronger prejudice and blinder bigotry on the other side. The ecclesiological revivers and restorers used to indulge in painful and probably overdrawn descriptions of the state of things in unrestored churches; but the anti-restorers for the most part seem possessed by such a spirit of opposition that people who in regard to other matters would probably be strictly truthful, in regard to the doings or even the intentions of supposed restorers will make sweeping statements upon no authority at all; will distort and exaggerate facts till their statements reach absolute misrepresentation, to use no stronger expression; and will invent wonderful and unheard-of canons of architectural criticism, evolved from their inner consciousness, in order to hold up to ridicule the doings of the hated restorer. Just as a generation ago "restoration" was the orthodox catchword for would-be æsthetic people, by the use of which, without any knowledge of the subject, they could pass as "superior people," so now the abuse of restoration and of restorers is a kind of passport to the ranks of the æsthetes, and mere declamation on the subject, without the accurate knowledge of a single fact, is enough. We regret to say that ladies are very prominent in this exhibition of zeal without knowledge. They are amongst the most bigoted members of the "Anti-Scrape" Society. As an example, we heard a lady member of that Society with the long name which has been thus indecorously abbreviated, inveighing against any one who pulled down an old building on any pretext whatsover. We ventured to hint that all the Mediæval builders pulled down the works of their fathers ruthlessly, and built up new ones on their very foundations; that almost every cathedral in England consisted largely of work built on the foundations of older work which had been pulled down because the later builders thought they could do something better. "Oh, indeed," was the reply in a tone of severe superiority, "I should like a proof of that!" The speaker might, of course, as well have asked for a proof that Mediæval churches had pointed windows and buttresses; but the abuse of architectural restorers may be indulged in nowadays without the slightest knowledge of even the outlines of the subject. Another example of the kind of architectural criticism which satisfies your anti-restorer is exhibited in a letter by Mr. W. J. Loftie in the *Times* of Wednesday, concerning what he calls the "frightful idea" of restoring St. Stephen's, Walbrook, of which he has heard rumours. To prevent misunderstanding, we may say at once that we have ascertained from inquiry that what has been suggested is merely letting down the pew-woodwork by one panel (removing a small bottom panel), so as to reduce the excessive height of the pews without altering the upper portion or finish of the woodwork at all. We should be very averse to making any alteration whatever in St. Stephen's unless on very strong practical grounds. The alteration proposed can hardly be called necessary, though it must be admitted that the high "sheep-pen" pew, however good the woodwork may be, is a construction very much at variance with modern feelings and habits among worshippers; and certainly the alteration talked of is not such as to materially affect the architectural aspect of the interior. But the very rumour fills Mr. Loftie's mind with indignation and contempt against all architects, who only propose these things out of spite against Wren, and because they cannot produce anything as good as he did. Mr. Loftie, it must be observed, speaks entirely from a standpoint above architects, as one instructing them in matters in which he is better informed. Mr. Loftie's claims to this position appear to rest on some rambling attempts at architectural criticism in his otherwise interesting "History of London,' in the course of which it appeared that he had never heard the name of Elmes, and attributed the greatest English building of the Classic revival to Wilkins; and on the authorship of the first volume of the "Art at Home" books, a plea for "Art in the House," written in a style worthy of Laura Matilda herself, and forming probably the very silliest of all that most silly series of booklets. Mr. Loftie's claims to rank as architectural instructor are characteristically exemplified in the letter on St. Stephen's, Walbrook. He says:—

> "There is probably nothing, except, perhaps, to remove the dome, calculated so terribly to injure Wren's design as cutting down the pews. They are the chief element in the extraordinary effect produced upon the spectator as he enters the church.

It will be understood at once when I say that the columns which support the dome and divide the aisles rest on bases so high that each column seems to rise from a floor level exactly with the top of the pewing. While, therefore, the visitor sees the whole design as if in a picture, the apparent size of the little building is immensely enhanced. Strange to say, I hear the proposed vandalism has the approval of several architects."

If Mr. Loftie can explain to us how the apparent spaciousness of a building is enhanced by making the floor of it appear 5 ft. 6 in. nearer the roof than it really is, we should be very much obliged to him. Most people in their ordinary senses would think that was the way to diminish the effect of size and spaciousness in a church or any other building. The common-sense of the matter is this :—The cutting down (or rather letting down) of the pews in the way described, by about eighteen inches, would be far more in accordance with the present (and the best) taste as to the furnishing of a place of worship ; it would take away nothing very material from the woodwork itself, and it would unquestionably give *greater* appearance of height and spaciousness to the church than at present. The one real architectural drawback to the alteration is that Wren arranged the bases of the columns to range with the height of the pews, and, if the alteration were made, there would then be eighteen inches of plinth left standing above the pew level. The effect would not be so complete, though it would be possible to treat the bases so as to connect them with the new line of woodwork. Of course this would involve introducing a new detail into a very complete work of Wren's, and we should oppose it on that ground, unless there were a very large congregation (which we believe there is not) who were seriously incommoded and annoyed by the present make of the pews. In that case practical considerations come first, an argument to which Wren himself would probably have readily agreed.

This question of practical expediency is one of the main points to be taken into consideration in regard to altering, restoring, or rebuilding old buildings ; and one which is apparently put totally on one side by the anti-restoration champions. There are three lights in which a building may be regarded ; we name them in the order of their importance. First, the practical fitness of the structure for the uses for which it is intended ; the first and most important in the case of all buildings, except purely monumental or memorial designs, and the one upon which, save in those cases, everything else ought to turn. Secondly, the building regarded as an artistic design. Thirdly, the building, with all the alterations through which it has gone, regarded as a part of history. By the anti-restorationists this latter consideration is put forward not only before the two others, but to the absolute exclusion of the two others. The completeness of the building as an architectural design, and its convenience for the uses for which it is intended, are to them, if one may judge by their own words, matters of no account whatever. History embodied in architectural changes and alterations is undoubtedly of very high value and interest, and to people engaged in special antiquarian studies it is naturally the chief interest. But that is not what buildings were erected for. They are erected firstly for use : secondly, when something higher than mere utilitarian value is aimed at, for architectural beauty, as harmonious and consistent designs. When there is any question of restoring an ancient building, of renewing it where dilapidated, of removing any incongruous additions that have been made to it, perhaps in a period of debased taste, and which are out of keeping with its architecture,—the rational course, instead of uttering hysterical denunciations against touching anything that a former generation has done, is to consider and weigh the balance of advantages and disadvantages of alteration, and decide accordingly. Take a church, as being the most common battle-field of restoration at present. If it is actually a ruin, and a ruin of noble architectural style, to touch it in any way, except for the purpose of mere maintenance against further decay, is rank sacrilege, and any patching up or reworking would at once destroy all its value and dignity as an architectural memorial. Few people, however, would ever propose such a course as this. But in the case of a church in use for worship, the first claim is that it should be kept in a seemly and decorous condition, that its fittings and interior arrangements generally should be in accordance with the convenience and the habits of the people of the present day who use it, and that it should be in thorough repair and in a state of structural safety. The latter condition we should presume no one would be silly enough to contest, though some of the protests of the "Anti-Scrape" Society would lead one to think that they ignore even this necessity, and that they would rather have the chance of a roof coming down on their heads than see it repaired or a new one substituted. In regard to fittings, if a former generation has filled a church with a style of fittings which are quite at variance with modern ideas of what is either convenient or suitable in a church, are modern congregations for ever to go on using them because they were once put there? As well say that a man who lives in an ancient mansion or castle is not to alter and refurnish it with regard to modern ways of living. Then there comes the question, not so easily to be settled, of purely architectural fitness and propriety. Now it is really necessary to remind people at present that there is such a thing as architectural design, and that one object of architectural design is fitness and coherence of all the parts one with another, without which quality the architecture ceases to be a harmonious whole, and becomes only a collection of scraps with no logical relation to one another. At a certain period of our history, our finest Mediæval churches were filled with objects,—monuments, reredoses, pews, and galleries, &c.,—in some cases absolute monstrosities, in the best cases entirely at variance with the architectural *régime* of the building. In some cases these are of such good quality of design and execution that it becomes a question whether the gain to completeness of effect by removing them to some other situation is at all equal to the loss of the total architectural interest of the building which would be involved in removing them.* In the case, however, of things which are not good in themselves, which are in bad and debased taste, and poor in execution, to scruple to remove them (unless they are monuments of those whose memory is worth preserving) is a mere superstition. A bad thing is none the better because it has been where it ought not to be for a hundred years, nor is it worth while to leave it in its place merely to show that some of our forefathers were fools. We have ample evidence of that historic fact, as our descendants will have some similar evidence about *their* forefathers, but it may be questionable whether it is a kind of fact which it is worth while making much architectural sacrifice to keep on record. But this worship of everything that has ever been done in architecture, because it has been done, is unworthy of thinking people. It is a standard such as has never been set up or acted upon in any previous age. It is carried to the extent of absolute falsifying of architectural criticism. As a prominent example, we may refer to the admiration which one now constantly hears expressed for the west towers of Westminster Abbey. Whoever designed these (for it is by no means certain that Wren was really guilty of them), there can be no question, with any unprejudiced critic who is competent to form a judgment, that they are just about as bad as they can be ; poor and weak in outline, and in detail a wretched travesty of Mediæval detail by an architect who did not understand it, and had not the slightest feeling for it. Had the Society before referred to been in existence when those towers were built the very same men (had they lived then) who now profess to admire them, would have fought tooth and nail to prevent their erection,—*must* have done so, on their own principles. But because the towers have stood there a couple of centuries they are to be regarded with admiration. Could critical inconsistency and imbecility go further?

The question of removing monuments, however bad, is, of course, one of some complication. The notion at present seems to be that any monument, however execrable in taste, is, by the fact of being a monument, sacred. The general feeling is no doubt a right one, but we would venture to suggest whether there is not a limit to forbearance even in this case. The desire to have our names commemorated on a monument is, after all, rather a weak side of human nature ; and when we consider how insignificant were some of the people who got hideous monuments erected to them, and how little worth is the fact of having your name preserved on a slab of marble when nothing worth knowing about the bearer of it has survived, we are inclined to apostrophise these dead names as Frederic did his soldiers who feared to go under fire,—"Dogs! would ye live for ever?" Monuments of nobodies, which are tasteless and poor, we cannot think have necessarily a claim to disfigure a building for ever ; especially as they might usually be preserved elsewhere. A case has been prominently mentioned in the course of the recent correspondence on the subject, of the removal of the "Pedlar window" at St. Mary's, Lambeth ; a portrait of a pedlar and his dog, who (the pedlar, not the dog) is reported to have left a piece of land to the parish on condition of being thus memorialised in the church. The window should be preserved, and it is reported that it is to be put in the vestry : the proper place for it : but a fuss has been got up about it as if an act of sacrilege had been committed. We should be disposed to say that the pedlar was guilty of a vulgar and unseemly ambition in wishing to be portrayed in the church, of all places, on such grounds, and that the then authorities of the church did an unseemly thing in entering into the bargain. The complainants make a point of the fact that it is displaced to make room for a memorial window to recent inhabitants of the parish, but we may take it for granted that this is not intended to consist of portraits of them (or of their dogs), but of some subject more suitable to a church. There is much more reason in the complaint of a Worcestershire Rector, that he found the old Norman font banished to the outside of the church by the restoring architect, "in favour of a new one of a kind that one may buy any day in London or Birmingham." If the old font was really in a condition in which it could be used, to banish it was contrary to all church tradition and association, for in most church rebuildings in the Middle Ages the font was preserved, even when the architecture of the church was entirely altered ; which is the reason so many Norman fonts are to be found in churches of later date.

To sum up,—the question of restoring and altering an old building is one to be considered dispassionately and in due reference to all the circumstances bearing on the practical utility and the architectural design of the building, and the true value of the objects it is proposed to displace. Each case, so considered, would be found to have its own special features and require its own special treatment, to be decided on grounds of reason and common sense, not on those of exaggerated and over-acted sentiment.

* N.B., not *destroying* them : nothing good in itself should be destroyed in any case. But it may be in its wrong place.

AN ANCIENT FOUNDATION RECORD.

THE new volume of cuneiform inscriptions which the Trustees of the British Museum have just issued under the editorship of Sir Henry Rawlinson will be welcome alike to the archæologist and the philologist. The very extensive and surprisingly productive series of explorations carried out by Mr. Rassam in Babylonia have resulted in very large and valuable additions to our national collection, and it is from these that the selection of inscriptions now published has been made. In the early

days of Assyrian decipherment it became apparent to students that Assyria was, in art, science, and literature, the child of Babylonia, and if they would study that literature in its early editions they must do so in the libraries of Babylonia. The ancient cities of Chaldea were most jealous guardians of the treasures hidden beneath their ruins, and for years the brick hunters and explorers had dug unrewarded. The discovery, some ten years ago, of the Egibi tablets opened up a new era in Babylonian explorations, and from that time there has been a continual flow of inscriptions and monuments into the national collection. The result of the opening up of these buried libraries of Chaldea has been a very extensive enlargement of the area of cuneiform literature, and proofs of a most indisputable kind have been furnished of the great antiquity of Chaldean civilisation. The inscriptions now extant show that long prior to B.C. 3750 the work of civilisation and development in Chaldea must have been going on, and changes in national life had taken place which could not have been accomplished in a few centuries, but must have occupied some thousands of years.

The fortunate accident that led Mr. Rassam to excavate at Aboo Hubba has restored to us the site of one of the oldest cities in Chaldea, in whose temples were preserved antiquities reaching back to a very remote period. The publication of the two cylinders of King Nabonidus, which were found in the coffer or foundation chest of the temple, as we have already described in the *Builder*, furnishes us with an insight into the history of this remarkable building and the changes it underwent during many centuries. Judging by the text of the inscription, which consists of about 170 lines, the cylinder was written in about the tenth year of Nabonidus, B.C. 545, a few years after the capture of Ecbatana by Cyrus and the overthrow of the Median empire. The cylinder records the restoration and adornment of three temples. 1. The Temple of the Moon-God, in the city of Harran, in North Mesopotamia. 2. The Exploration and Restoration of E-Parra, the Temple of the Sun-God. 3. The Exploration and Restoration of the Temple of the Goddess Anunituv. Both of the latter were in the city of Sippara, the site of which is marked by the mounds of Aboo Hubba. The archæological value of this inscription consists in the insight it affords into the way in which the kings carried out their pious works of restoration. The first duty of a king when engaged in the work of restoring some ancient temple was to search for the memorial records of the founder or previous restorers of the temple. All the memorial tablets and cylinders which have been found in the temples and palaces of Assyria and Babylonia conclude with a solemn request to future descendants of the writer to respect his records, to clean and replace them, as for example, in the tablets of Assur-nazirpal (B.C. 885) found at Ballawat, which are published in this volume (pl. 69-70), where we read :—"O future prince among the kings my sons whom Assur shall proclaim him! When the temple shall decay and this tablet thou seest, and thou removest, its ruins restore thou. The characters of my inscribed name to its place restore thou. Bel, the great god; Assur, the lordly prince; and the god Makhir, dwelling in this temple, in the raising of their eyes, firmly may they establish. His writing, his name, his seed in their land, may they establish. Whosoever this tablet shall see, and sins [curses] many shall repeat. O goddess Istar, lady of war and battle! His weapons then thou breakest, his throne then thou takest from him. Whosoever this tablet shall see and raise it up, the altars shall cleanse, a victim shall sacrifice, and to its place restore. Assur the great lord his praise shall hear, and in the battle of the kings, in the place of the onset, the courage of his heart shall find for him."

In the works of restoration which he undertook, the Babylonian king most religiously fulfilled the prayers of his ancestors, and it is from the record which he gives of the various foundation-stones he found, that we gain much valuable chronological information. The Temple of Harran, which he restored, was a very ancient edifice, and, though strictly speaking, not a Babylonian temple, was affiliated with the great centre of Chaldean moon-worship, the temple at Ur. In an ancient astronomical tablet, mention is made of the planet Mercury "as the star and prince of the men of Harran"; and there is a seal in the British Museum on which is represented a priest standing before an altar, surmounted by a cone, and above the cone a star, with the inscription, "The God of Harran." This temple was probably in existence when Abraham migrated from Chaldea, and as a colony from Ur would be the city he would most naturally remove to. During the disturbed state of West Asia, from B.C. 625 to the establishment of order by Nebuchadnezzar and his successors, the temple had been sacked by the Sabmanda,—or barbarian hordes of Scyths and Medes,—and Nabonidus was commanded in a dream to restore it. In his search for the records of his ancestors he found the cylinders of Shalmanesar II. (B.C. 859), the son of Assurnazirpal, who had visited the city when marching against the Syrians. He also found there the cylinder of Assurbanipal, which had no doubt been placed there soon after the king's coronation in this temple, which took place in B.C. 668. The work of restoration seems to have been very important and to have extended to the city as well as the temple, as the king speaks of his restoration of "the city and the temple"; and again he says, "the city of Harran in all its extent" was restored by him. The work of restoration is described as consisting of a thorough rebuilding of the temple, "the walls were rebuilt, and in parts "plated with gold and silver, and decorated with white marble." The doors were of cedar-wood, with bands of gold and silver inlayed with precious stones. At the gate of the rising sun (east gate) the king placed right and left two colossal figures of the god Lakhma, the god of Light. The work completed, the king says that amid great rejoicing and shouting he made "the city of Harran and this temple as, bright as the rising moon." The city of Harran was a town of considerable importance in North Mesopotamia, and derived its name from the word *kharranu*, a road, it being then as now the centre where all the chief roadways met. The city has recently been visited by Professor Edward Sachau, of Berlin, and is described by him in his work, "Reise in Syrien und Mesopotamien." The town was crescent-shaped, and the Arab chronicles say that Harran was shaped like the moon, no doubt an echo of its ancient celebrity as a moon city. In the centre of the south portion is the castle mound, rising to a considerable height, and beneath which in all probability are the ruins of the temple. There are six gateways; and here centre the oldest commercial roads in the East. The Harran-Serudj-Berejik road, the ancient North Hittite road which passed through North Syria, Asia Minor, to the shores of the Ægean; the Harran Jerabis route, the ancient road to Carchemish and Aleppo, traversed no doubt many times by the armies of the kings of Assyria. The roadway passing south through Kalat Nedjim, the ancient Tul Barsip, to Damascus *viâ* Tadmor (Palmyra). Eastward were two roads, the one leading to Diarbeker, the ancient Armenian route to Van, and the Mosul road, the ancient route to Nineveh. Here, then, is one of the most important centres of civilisation in Western Asia, a city *old* in the days of Abraham, awaiting the touch of the explorer's spade to yield up a rich store of buried records. The cylinders of Shalmanesar and Assurbanipal were cleaned by the pious restorer and placed along with his own, and are no doubt lying *perdu* until unearthed by the explorer. The work of restoration of the two great temples at Sippara was more elaborate than that at Harran, and the search for the records of previous benefactors to the shrine even more careful. During the wars and rebellions subsequently to the establishment of the Sargonide dynasty in B.C. 721, this chief city of North Babylonia had suffered very considerably at the hand of the spoiler, and in B.C. 663 the Elamites had spoiled the temple and carried off the images of the gods. In the fine terra-cotta cylinder of Assurbanipal (Cylinder B) the king records his works of restoration; also in a barrel cylinder, printed in this volume,—but they appear to have been only partial, and it remained for Nebuchadnezzar, "the Great Builder King," to undertake the thorough work of restoration. The work must have been a very heavy one, for the King (Nabonidus) records in this inscription that his predecessor was engaged for more than forty years on the work, and then had not completed it. Nebuchadnezzar appears to have searched vainly for the records of the foundation of the temple, and the search being continued by Nabonidus he found at last, at the depth of 18 cubits, that is 30 ft., a memorial record of Naram-Sin, son of Sargon I., king of Agadhe or Akkad, one of the quarters of Sippara, which had been placed there 3,200 years previously to his reign, that is in B.C. 3750. This very astonishing date does not rest upon the authority of one inscription, but is repeated in a duplicate copy recently discovered,—and the subsequent discovery by Mr. Pinches of a chronological canon of Babylonian kings, indicates that the scribe who wrote this text no doubt consulted the lists of kings in his temple library.

The depth to which the excavations had to be carried to find this record seems strongly in favour of the authenticity of the date, and the fact that the temple had at various times during that period been demolished and repaired by nearly one hundred kings may account for the accumulation of matter over the record.

Having cleaned and repaired this record, and sacrificed the victims, and poured out libations, the king restored it to its place. During the search for this record, the statue of the Sun-god had been removed from the shrine to another, and it rested there until the works were completed. As in the case of the temple at Harran, gold, silver, and precious stones were lavishly used. One fact recorded is the use of *five thousand* beams of cedar wood for the ceiling of the shrine.* The work of this temple completed, the king commenced the restoration of the sister temple dedicated to the goddess Anunituv. This goddess,—the Babylonian form of Istar or Venus,—was the goddess of the morning and evening star, "who," as the inscription says, "at the rising and setting of the sun made glad the heart of Nabonidus." A curious detail of symbolic decorations is recorded in her temple, some chambers of which were explored by Mr. Rassam, was decorated with black and white, as emblematic of the morning and evening. In the exploration of this temple, and the search of records for previous restorers of the shrine, the king found the memorial-stone of King Sagaraktiyas, son of Kurdur-Bel, which, he states, has remained unseen for 500 years, thus fixing the date of this king as B.C. 1050. The work of restoration of this temple was much the same as that of the other temples,—gold, silver, precious stones, marble, and crystal being lavishly used. From this valuable archæological text we gain many new technical terms, such as the words for foundation, *ussu*, literally "base," the foundation-stone being called *timien*, literally "*line is made*"; roof, *takhupi*, that is "covering"; and the bands of brass on the gates, such as the scrolls from Ballawat, were called *sukuruti*, or "ties." This text is one of the fullest and, fortunately, best-preserved records yet recovered from the ruins of Babylonian temples, and its publication reflects great credit upon the Trustees of the British Museum.

In like manner to his ancestors, this royal archæologist concludes his inscription by commending his foundation record to those who come after,—to read it, clean its inscription, and to restore it to its place uninjured. Could he but see the place of honour it now occupies in the New Room of the Assyrian Department, surrounded by the like records of many who before and after him ruled the land of Chaldea, we doubt not that he would be satisfied.

* The word *tsilli* literally means "overshadowing," and is from *tsillu*, "shade," and must therefore be the ceiling.

WATER PURITY AND SEWAGE PURIFICATION.

THE recently-published volume of Transactions of the Sanitary Institute of Great Britain contains the address of the late eminent analyst, Dr. Angus Smith, at the Congress held last year at Glasgow. It deals so largely with the much-discussed subject of water purity and purification of sewage, that it seems singular no one in the recent Conferences should have thought of quoting the views held and propounded by such a distinguished authority. It may be useful, therefore, at the present time to draw attention to some of the remarks contained in that address. Commencing with an allusion to the labours generally of M. Pasteur in France as "of a kind which cannot be too highly admired," he refers more especially to his latest discovery, viz., "the attenuation of the virus of chicken cholera by the action of the air and oxygen." Quoting Pasteur's own words regarding the cultivation of virus in contact with air, and the experimental test by which he was enabled to pronounce as a principle that "it is the oxygen of the air which attenuates and extinguishes virulence," and which led him to the supposition that "it was oxygen, as an ever-present agent, that set the limits to great epidemics," Dr. Angus Smith explained how he himself, while pondering over the effect of oxygen on organic matter, was led to the conclusion that "it destroyed those minute forms which have been shown to be concomitant with putrefaction and decay." A similar mode of thought had previously led him to consider that it was the want of an excess of oxygen that caused confined sewer gas to be dangerous, whilst the enormous amount of gas coming from decomposing matter, such as on the Clyde, seemed to pass away, leaving comparatively little effect. This purification of the polluted waters of the Clyde, Professor Smith explains thus,—"The air may act in two ways. It may act by rapid oxidation of the substances in the water, or by dilution of the gases when formed, and the destruction of putrid matter in water is really very rapid when plenty of air is allowed. Air is brought to the Clyde by the water, and also by the waves, both artificial and natural, exposing a great deal of surface. The air may act also merely by rapid dispersion of the gases"; but as in the case of the Clyde no marked type of disease, such as is produced by confined sewer gas, has been generated, the conclusion is drawn that "it is not to mere dispersion, but to a more thorough putrefaction and oxidation, and to a more complete destruction of the organic substances by the abundance of air than can take place in sewer water," that the Clyde owes its immunity.

The observations which follow, while unfolding a provision of hygienic action in nature known but to comparatively a small section of the community, explain the process so clearly as not to require any special scientific knowledge for its comprehension; but they have such an important bearing on what may be almost termed the absorbing topic of the day for the dwellers in London and its suburbs, that little apology is needed for transcribing them at length. "If nature," Professor Smith observes, "had contrived no method of destroying such seeds of death, populations such as that of Glasgow would never have grown up. And what is the method? That method is first, putrefaction; at least, I know of none other, except the concluding portion of that work, viz., thorough oxidation. When, therefore, you see the Clyde seething with gases of putrefaction, and when you smell it to such an extent that a feeling of loathing is produced, you may remember this, that the work of destruction is going on with a wonderful rapidity, and that the enemies of life are being slaughtered there millions upon millions, never to appear again in a similar form, though other generations of them may rise up. As putrefaction seems not to take place without the action of organisms, I had the idea that it might be arrested by an abundant use of air, and I had some belief that the oxidation took place very rapidly after putrefaction. It was when examining this subject that I found it necessary to touch also upon the question of vitiation in water. When nitrogenous bodies decompose with an abundance of oxygen, the nitrogen becomes oxidised, and nitric acid is formed. I had long suspected that the reverse also took place, and that when there was an excess of putrefactive matter, oxygen was absorbed and even removed from the nitrate, whilst free nitrogen was given off. This process I was able to verify by carrying it on in the laboratory. It was clear, then, and beyond all cavil, that rivers could purify themselves in time, and organic matter be thoroughly removed. It was my belief that organic substances, that germs of disease, that microbes, or the smallest organisms themselves, were all subjected to this universal and unsparing attack of putrefaction and oxidation." In his Report on the Rivers Pollution Prevention Act, Professor Smith, referring to the above-mentioned results, pertinently asks, "How far, then, can oxidation, or a great supply of air, be employed to destroy putrefaction, or to purify? The bearing that it has on the analysis of water will be clearly seen by chemists." We took occasion to remark, in a recent notice on the late General Scott's pamphlet, that too little importance had been ascribed to the aëration of water, and the above quotations from Professor Smith's address greatly emphasise our observations on the desirability of the water companies devising some means to give the requisite aëration to water pumped from the Thames and other rivers with a view to still further depriving it of such organic impurities as it may still contain. With such an authority as that of Professor Angus Smith on the self-purifying power of rivers, supported by the opinions and scientific investigations of Professors Sorby and Odling, it seems little short of folly to advocate the disuse of river-water for our domestic supplies (at least in cases where the river is adequate to the demand), and to incur great and needless expenditure in leading water from distant sources, or in raising it from enormous depths, when by a comparatively small outlay on the process of aëration, the obvious sources of surface supply so bountifully provided by nature can be rendered innocuous from the pollutions resulting either from an excessive growth of our population or from the ever-increasing demands of our civilisation.

But not only is oxidation a chief agent in the purification of water, but its effects are equally remarkable when applied to sewage. "Substances and living things, the Professor observes, "may be carried by the rapid sewage system into the range of a new activity before undergoing that putrefaction which breaks them up in proximity to us or in the sewers themselves. It seems to point to a plan of causing the destruction of organisms by putrefaction and subsequent oxidation or by chemical action. At least it seems to me that we require to learn if it be true that any of the germs of disease will live in an abundance of good air. We know that abundant dilution will render them all ineffective. It is probable there will be a difference amongst them in this respect, whilst all will yield to the double action of,—first, putrefaction, and then oxidation."

After explaining the character of the changes involved in the word "decomposition," the doctrine sought to be emphasised is that putrefaction in a certain stage is one of the greatest of purifiers, and the most complete that nature has devised. By the germ theory, it is supposed by many who use it without knowing its meaning, that some little germ of disease passing from a sewer into a river may carry with it power to infect other organisms, and thus endanger the lives of all within its reach. But it is abundantly evident from actual results that no such power of infection exists in any of the germs yet known when putrefaction and oxidation are abundantly given. Probably the River Clyde is subjected to as great, if not greater, pollution than any river in the United Kingdom, and yet, as Professor Smith observes, the number of persons who go down from Glasgow to the Firth of Clyde, and who receive health and strength there, are living testimonies to the absurdity of current ideas as to the power of germs in such situations.

The treatment of sewage is certainly the burning question for the day to Londoners, and, therefore, a contribution towards its solution by so eminent a chemist is deserving of the most attentive consideration. Experiments for ascertaining the complete disruption of organic matter in water first led Professor Smith to the thought of driving air through sewage in order to produce oxidation, in the belief that excess of air would be offensive to the microzymes, although a small amount seemed necessary for their activity. But the late Dr. James Young was of opinion that that process would be found too expensive, and he conceived a plan of passing steam through sewage at a very low tension, and, consequently, with an enormous bulk. Dr. Young died before he could perfect his design, but it is believed that he had thoroughly mastered the subject, and that it may yet be possible, from the information contained in the papers which he has left, to bring his process to a practical issue. Unhappily the great mind which would, doubtless, have best contributed to this end has likewise passed away. It is to the marvellous powers of oxygen, however, that Professor Smith was desirous of directing special attention.

"It would seem," he observes, "as if this wonderful agent had the remarkable power of blowing hot and cold, of producing strength and weakness, being our greatest friend and an enemy from which we cannot escape. No wonder, then, if we give it many contradictory duties to perform. It was always known that pure air had a cleansing power, and it has long been known that oxygen was the main agent there; but it has somehow happened that its rapidity of purification has never been brought so clearly to my mind as by these experiments on the purification of sewage. The act of purification is to be seen here rapidly. It is not the work of days or weeks, but the work of minutes; and the belief is taken out of the region of reasoning into that of the simplest observation." If this statement be correct,—and who can call it in question?—the solution of the problem of the disposal of sewage cannot be very far off. In comparison with the Clyde, the Thames, even in its worst portions, is a wholesome river, and there can be little doubt that the dwellers on its banks have, like those on the Clyde, to be thankful for the self-purifying process that Nature has provided for the immunity which they have consequently experienced from the worst form of epidemics, which, according to many authorities, ought to have decimated the metropolis long ago. Nature is long-suffering, and left to itself works miracles more wonderful and sure than human science can do; but at the same time there is undoubtedly a limit even to the powers of Nature, and to that limit it would seem we are rapidly approaching.

It behoves, then, those with whom the authority and the purse-strings rest to bestir themselves ere it be too late, and to relieve the river from, at all events, any further addition to its sewage burden. Prevention is better than cure; and, therefore, the sooner a diversion of the sewage of the metropolis to the sea can be made, the safer will it be for the health of our great city; but at the same time it is to be hoped that the lessons which the late distinguished Professor sought to teach may bear practical fruit in the purification of both our water supplies and sewage.

NOTES.

THE President's address at the opening of the Social Science Congress dealt mainly with the subject of the increase of State intervention in the form of legislation, of which subject a very comprehensive summary was given, mainly tending to the acceptance of State intervention as a fact of the age, and as in the main beneficent in its results and even a necessity for the proper working of society in the present day. In one class of interests, however, he admitted that Parliament had resisted every attempt to make Government responsible,

viz., in regard to the working and management of railways. We do not know whether Mr. Shaw Lefevre means to hint that Government intervention might be extended in this direction also. We can imagine nothing that could well be more disastrous to the interests of the travelling public. Some of the companies require some pressure to induce them to adopt improvements which they ought to have adopted long since; but in the main, competition, scientific enterprise, and a certain pride which first-class companies take in the working of their lines, are better securities for good service than any that Government could offer.

IT not unfrequently happens that a myth little known or unknown to literature is specially emphasised by Greek vase-painting. A good instance appears this month in the Monumenti of the German Institute at Rome. On an amphora recently discovered at Orvieto the following design appears:—Herakles, unmistakable from his lion's skin, is at work digging the earth with a pick, near him an uprooted vine. To his right a bald, old man threatens him with a hammer; the bald, old man is of the type peculiar to Silenus. To the left of Herakles stands his patron goddess Athene. Evidently the story embodied here is the myth of some labour of Herakles, in which he was compelled to work at agriculture, in the service of the old wine-god Silenus. A similar design appears on two other vases, one in the Louvre, the other at Capua. Their style forbids the supposition that they take the inspiration from the Satyric drama of Euripides. The execution of the vase now published in the Monumenti clearly belongs to the middle of the fifth century. It has all the marks of the manner of the Attic Cylix, masters whose best known representation is Hieron. It has therefore to look for its inspiration to some early form of the legend of which we have no literary record.

NOW that the juncture of the Metropolitan and Metropolitan District Railway is approaching completion, it is a proper time to call attention to the want of a connexion between the Great Western and Metropolitan Railways at Paddington,—a connexion, we mean, by which passengers may be able to pass from one station to another without climbing steps, and having to cross a crowded thoroughfare. Such a connexion has now for some years been in existence between the Great Eastern and the Metropolitan Railways, and it is perfectly scandalous that the same kind of passage has not been made at Praed-street. It is a cause of much inconvenience and very often of considerable delay when passengers from one station to the other are obliged to enter the street. One would have thought that the Metropolitan Railway, from motives of self-interest, would have endeavoured to secure as many passengers as possible from the Great Western system, instead of leaving them to be caught by cabs and omnibuses. It is to be hoped that if these companies do not make the necessary connexion Parliamentary attention will be drawn to the subject whenever a Great Western or a Metropolitan Railway Bill comes before the House. For if the companies will not of their own motion consult public convenience on this point, pressure should be put on them to compel them to do so.

WE hear with great regret of the death of Mr. Walter R. Browne, the engineer, who crossed the Atlantic to attend the meeting of the British Association, and died of typhoid fever at Montreal on the 4th of this month. Mr. Browne, who was only forty-two years of age, combined with great ability and knowledge of professional matters the talent also,—not always found in combination with engineering proficiency,—of clear and forcible literary expression and exposition of his knowledge on special subjects. A brilliant paper read by him at the Annual Meeting of the Iron and Steel Institute in May last led us to invite his co-operation in this journal, an invitation to which he responded with the energy and readiness which seemed part of his nature; he had already contributed several papers and Notes on engineering subjects to our columns, and voluntarily undertook to act as our special correspondent in the Mechanical Section of the British Association meeting, and it was to his expected communications that we referred in a "Note" in reference to the British Association proceedings (page 284, *ante*); communications which were destined never to be written. He had projected an important series of papers on a special subject for this journal, to be commenced immediately on his return. If we may judge from what we came to know of him in the course of business, those who were his most intimate connexions will have had still more occasion to regret his loss as a personal friend.

UNDER the title of "Links in the History of the Locomotive," the *Engineer* is publishing a very interesting series of illustrated articles. Last week appeared No. 17 of the series, which endeavours to clear up some doubtful points as to the celebrated locomotive built by George Stephenson, and known as the "Rocket." There were, it now appears certain, two "Rockets" built by Stephenson. The first one was built in 1829, and of this the *Engineer* publishes an illustration copied from a drawing made by Mr. Phipps, M.I.C.E., who was employed by Messrs. Stephenson to compile a drawing of the "Rocket" from such drawings and documents as could be found. This gentleman had made the original drawings of the "Rocket" in 1829. But "Mr. Phipps is quite silent about the history of the engine during the eleven months between the Rainhill trials and the opening of the [Liverpool and Manchester] railway." Concurrently with the illustration we have mentioned, there is also published an exceedingly interesting *fac simile* of a sketch made by James Nasmyth (subsequently the inventor of the steam hammer, and of whose facility as a draughtsman we had occasion to speak some time ago) of the "Rocket" of 1830. On this drawing is the following memorandum, in Nasmyth's handwriting:—"This sketch of the 'Rocket' I made at Liverpool on the 12th of September, 1830, the day before the opening of the Liverpool and Manchester Railway, while it remained stationary after some experimental trips in which George Stephenson acted as engine-driver and his son Robert as stoker. James Nasmyth." That the engine now shown at the Patent Office Museum, South Kensington, is not the one which was sketched by Nasmyth, is very evident. Our contemporary does not so much question that the "Rocket" at South Kensington is in part, perhaps, the original "Rocket" of Rainhill celebrity, as that it ever ran in regular service on the Liverpool and Manchester Railway. But then, what became of the "Rocket" of 1830? The suggestion is that the first "Rocket" was cast on one side until it was bought by Lord Dundonald. But the "Rocket" of the Manchester and Liverpool Railway is hardly less worthy of attention than its immediate predecessor, and concerning it information is needed. There are probably men still alive who could clear up the question, and it is to be hoped that they will do so.

THE question of keeping Highgate Woods as an open space is one of immense importance to the metropolis. It is obvious, however, that the Ecclesiastical Commissioners cannot do otherwise than make the most they can out of this property. They are bound to administer their property to the best advantage, without regard to the question of whether or not it is pleasant or advantageous for a neighbourhood. At the same time it seems equally clear that in dealing with a property like these Highgate Woods the Commissioners may, without failing in their duty, make the offer of the ground to the public, or to any body representing the public, if such body can pay the same sum as would be received from selling or letting the ground for business purposes. Of course, Parliament is supreme, and can pass any special measure in regard to the Ecclesiastical Commissioners and Highgate Woods which they please. But one thing there can be no doubt about, and that is, that since public attention is directed to this matter, the Commissioners should hold their hands before dealing with the property, in order to let the public feeling come to some practical determination.

WE have received from Frankfort-on-the-Maine a pamphlet by Herr Herrmann Ritter, architect, giving an account and illustrations of an ingenious but very complicated drawing instrument invented and patented by himself for mechanically translating the lines of geometrical plan and elevation into perspective. It would be impossible to make a description intelligible without drawings; but we mention the fact that those who feel any curiosity about it may apply, if they like, to the inventor, or to Maubach & Co., of Frankfort. Our impression is that it is just one of those things which look beautifully clever and complete in a drawing, but which in practice would be more trouble than the result is worth. A good draughtsman wants no machine.

THE autumn congress of the Sanitary Institute of Great Britain commences at Dublin on the 30th, under the Presidency of Sir R. Rawlinson, C.B. The department of "Sanitary Science and Preventive Medicine" is presided over by Dr. T. W. Grimshaw; that of "Engineering and Architecture," by Mr. C. D. Cotton, C.E., and that of Chemistry, Meteorology, and Geology, by Dr. C. A. Cameron, the gentleman who cannot perceive any sewage nuisance in the Thames at Barking. As Dr. Cameron is Superintendent Medical Officer of Health for Dublin, it is to be hoped he is more sensitive as to the Liffey.

ON Wednesday last were interred at Highgate Cemetery the remains of Mr. John Netten Radcliffe, formerly one of the Medical Inspectors, and more recently Assistant Medical Officer of the Local Government Board. Mr. Radcliffe has done so much good work for the advancement of public health and the promotion of hygiene generally, that his memory deserves a grateful record in this journal, which has ever aimed at the advancement of those important objects. Mr. Netten Radcliffe, who began his career as a volunteer in the medical service of the Turkish Army during the Russo-Turkish War 1854-5, was the inventor of the hospital tent which bears his name, and which has often done good service in epidemic outbreaks of disease. In 1874 was published his celebrated report to the Local Government Board on certain means of preventing excrement nuisances in towns and villages,—a report which is regarded as a standard work on the subject of that branch of nuisance-prevention. Mr. Radcliffe also wrote some valuable reports on hospital hygiene, and among these were three of special importance relating to the structure and arrangements of the Radcliffe Infirmary at Oxford, the Norfolk and Norwich Hospitals, and the Royal Infirmary at Manchester. These were published in the Medical Officers' Supplement to the Sixth Annual Report of the Local Government Board, 1878, and are well worth the careful study of any architect engaged in hospital work. Mr. Netten Radcliffe retired from official life in 1883, in consequence of failing health, and died on the 12th instant at the age of fifty-seven.

THE *Courier de l'Art* is very severe on the work that is being done in the way of the decoration of the Panthéon:—"Ce sévère colosse qu'on est en train d'affubler d'un habit d'arlequin." The latest additions to the decoration are two frescoes by M. Maillot, in one of the lateral chapels, and a mosaic by M. Hebert. The subject of the latter is "Christ teaching the Guardian Angel of France the Destinies of her Country." The guardian angel is Joan of Arc, who, habited "*en cuirasse*," is "presented" by the Virgin. M. Hebert is credited by our contemporary with skill in the arrangement of the composition, but with far too mediævalising a tendency in his efforts to consider decorative effect. He has placed in the classic Panthéon mosaics of the early Ravenna type. The artist is accused of having given himself to this style of late, and

exhibiting in the *Salon* every year one of these dying creations, figures with green flesh, hollow eyes, which make the spectator feel ill to look at them. In the mosaic, "Le Christ, la Vierge, les anges, tous sont longs, longs, comme des jours sans pain." Nevertheless, the critic somewhat inconsistently admits that this "longueur" gives a character of idealism to the figures which does not displease him. Some painters and critics with us seem to be of the same mind.

SUBTERRANEAN RAILWAYS IN PARIS AND IN LONDON.

THE pressure of population on the channels of communication, of which we have so much experience in London, is becoming intolerable in Paris. In 1881 a population of 2,243,000 persons was contained in 77,000 houses, over an area of thirty square miles, in that city. In the same year the "Greater London" of the Registrar-General contained 4,764,312 inhabitants, occupying 645,818 houses, built over an area of 697 square miles. The total passenger traffic of Paris is returned at 340,000,000 persons in the year, or about 932,000 per day; of whom about 34 per cent. were carried by tramways, 31 per cent. by omnibuses, 30 per cent. by cabs and other vehicles, and 5 per cent. by steamboats. In London the total amount of traffic is not accessible; but 384,000 pedestrians and 75,000 vehicles pass daily over the metropolitan bridges; and the traffic on three of the metropolitan railways,—viz., the Metropolitan, the Metropolitan District, and the North London,—amounted in 1881 to 373,000 passengers per diem. This total takes no account of the daily influx of passengers by railway at Victoria, Paddington, Euston, St. Pancras, King's-cross, Ludgate-hill, and the Eastern Counties Termini, or of those who, arriving at the London Bridge or the Waterloo Stations, do not cross the river; or, again, of the dense traffic on the high-level line from Charing-cross to Cannon-street. The rate of travelling in Paris, according to the previous statement, is rather more than 150 journeys per inhabitant per annum. Going and returning, then, without counting pedestrians, each Parisian will only take an enumerated trip by vehicle three times in a fortnight. At the same rate the London journeys by railway or other vehicle would amount to upwards of 711,000,000 passenger trips per annum, or nearly 2,000,000 per diem, without counting pedestrians.

Whether we regard London, Paris, or any other great centre of population, it becomes apparent that an enormous amount of inconvenience and loss of time is due to the abandonment of the ancient Roman method, borrowed from the camp, of building cities on the plan of straight thoroughfares, crossing each other at right angles; a return to which excellent method has been accomplished by the builders of the rapidly-growing cities of the United States. The actual loss of that time which has a direct money value that is incurred by the want of a direct thoroughfare, either for locomotives or for common road vehicles, from the northern to the southern railway stations in London, must be something very serious indeed. In Paris there exists a similar inconvenience, although, of course, on a smaller scale, which it is now proposed to remedy. Three lines of subterranean railway are projected for this purpose. One will connect the Chemin de Fer de l'Ouest with the Lyons Station, with a branch to the Arc de Triomphe, and another, by the Trocadéro, the Mont Parnasse, and the Orleans Stations to the Sceaux Station. Lastly a line is to run north and south, inside the existing Ceinture Railway, passing the Nord and Est Stations, the Bourse, and the Halles Centrales, to the Sceaux Station.

The total length of the lines which it is thus proposed to construct is 23·25 miles, for which the estimate is 5,720,000*l.*, or about 246,450*l.* per mile. The average gross revenue of the tramways along the *boulevards* and from the Place de l'Étoile to La Villette, together with that of the three-horse omnibus service along the Boulevards La Madeleine and Le Bastide, is 26,833*l.* per mile per annum. If the new line provide for the traffic *a grande vitesse* only, as will probably be the case, and if the traffic secured by the new line yields an equal revenue per mile to that above cited, there can be little doubt that the undertaking would pay 6¼ per cent. on the capital; while, if the amount of the omnibus traffic cited be taken as a measure of revenue, the return would be between 9 and 10 per cent. on the capital, assuming the estimate not to be exceeded.

It may be instructive to compare this outcome with that of the railways through London. Unfortunately, the accounts of the Charing-cross and Cannon-street line, like those of the Ceinture Railway in Paris, as involving operations on the part of more than one company, are not distinguished in the annual returns. But we can take the average of the statistical features of the North London, the Metropolitan, and the Metropolitan District railways, which form an aggregate length of fifty-two miles. Of these, the cost per mile, at the end of 1883, averaged 416,538*l.* The gross revenue was 30,047*l.* per mile per annum, and the working expenses came to 14,400*l.* per mile per annum. The resulting earning on capital is only at the rate of 3 52 per cent. per annum; but this net return on traffic is reduced by the omnibus character of the North London traffic, which, following the usual law in such cases, costs 51 per cent. income to work, while the two passenger lines are worked at 42 per cent. of gross income. On the North London Line each servant of the company only earns 227*l.* per annum, while on the Metropolitan District the mean earning per servant is 348*l.*, and on the Metropolitan, 395*l.* On the Ceinture Line (*Rive-droite*), the earning of each servant of the companies engaged averages 358*l.* per annum; while the average earning per servant on the Metropolitan and Metropolitan District Lines, taken together, is 375*l.* It thus appears that it is safe to estimate the working costs of the new Parisian lines as not likely to exceed 40 per cent. of the gross income, while the capital cost is only about five-eighths of that of the three London lines.

It may be hoped that a consideration of these figures may tend to stimulate the attention of the metropolitan authorities to the construction of a better line of communication from north to south in London. The enormous cost of a line through London itself is very formidable, and can hardly be encountered by the promoters of any new line, taken *per se*. In 1878 the cost of the Metropolitan Railway stood at 639,000*l.* per mile, and that of the Metropolitan District Railway at 680,000*l.* per mile. The distances then open were 14 miles and 9 miles respectively; and the extension of the lines to cover distances of 22 miles and 18 miles has reduced the enormous mileage cost, while at the same time it has fed the traffic. At present, however, while regarding the possible development of electric traction, it perhaps is hardly the moment for asking the public to find two-thirds of a million per mile in order to link Euston and Charing-cross by railway. As to a well-laid out and practical street, however, a hint may be taken from the returns of the traffic of the Paris omnibuses. Let us give one pair of facts alone. The earning of each passenger carriage on the Metropolitan District Railway in 1879 was 2,028*l.* The earnings of each three-horse omnibus running along the Boulevards La Madeleine and Le Bastide since 1883 amount to 2,272*l.* per annum. It is true that it costs nearly three-and-a-half times as much to move an equal weight for a mile over the road as it does over the railway. But, on the other hand, the interest of money required is eight times as much in the latter case as in the former. Without expressing an opinion as to what is best, there can be no doubt that a wide, straight, well-paved street, served by a thoroughly well-ordered horse service, would, at the same time, be a great benefit to London, and a highly remunerative enterprise to the purveyors of this mode of communication. In fact the figures above cited, which are the result of a long series of observations, explain how it is that the dividend of the London General Omnibus Company is something more than twice the net earning on capital of the Metropolitan Railways.

Penally.—The ancient church of Penally, well known to holiday visitors at Tenby, has been reopened, after restoration of the interior. The floor has been relaid with encaustic tiles, and the whole series of six windows filled with stained glass. The east window, which was in very bad condition, has also been restored, and the church lighted with the Hesperus lamp, the whole of the work having been carried out by Messrs. Jones & Willis, of London and Birmingham.

THE CHURCH OF ST. NICHOLAS, DEPTFORD.

"Sey forth thi tale, and tarye nat the tyme;
Lo heer is Depford, and it is passed prime;
Lo Grenewich, ther many a schrewe is inne;
It were al tyme thi tale to bezynne."
CHAUCER, *The Reeve's Prologue.*

WE recently directed attention to some extensive repairs which have been begun at St. James's Church, Piccadilly. Subscriptions are invited to the amount of 2,445*l.* towards a thorough restoration of another important parish church at the opposite end of the town,—that of St. Nicholas, Deptford. Its ancient grey tower with turret, said to date from the twelfth century, must have formed in generations past, like to the windmills on the opposite Isle of Dogs shore, a prominent landmark to shipping in the Thames. Bearing northwards are Cuckold's Point and Limehouse Church, whilst due east stand the cupolas of Greenwich Hospital with the wooded slopes of the Park beyond. Dedicated to the patron saint of sailors, the church stands on a plot of ground lying between Deptford-green and the Stowage, having Rose Cottages and the almshouses to the east. The nave, aisles, and chancel, of red brick, were built in 1697, and have been repaired upon two subsequent occasions. The register contains entries relating to the Pett family, the eminent ship-builders, one of whom, Peter, was master shipwright to Queens Mary and Elizabeth, the royal dockyard having been established here in their father's reign. In the burial-column we read, under date 1st of June, 1593, "Christopher Marlowe, slaine by Francis Archer." There are monuments to two of Evelyn's children, to dockyard officials, to Captain Fenton, a companion of Frobisher in two voyages, and to many naval commanders distinguished for their prowess during the last two centuries against our Dutch, Spanish, and French enemies at sea. The parishes of St. Nicholas and St. Paul, covering nearly 1,700 acres, constitute the lower and upper towns respectively; the latter, made separate in 1730, contains more than seven-eighths of the total population, and is served by a fine stone structure,—one of Queen Anne's "Fifty" churches. It stands in the midst of an extensive and well-kept graveyard. St. Nicholas's burial-ground is detached from the church, and has an entrance in Wellington-street. Having been laid out, at a cost of 300*l.*, by the Kyrle Society, this ground was opened on the 9th of July last by the Countess of Selborne for public recreation.

William the Conqueror, according to Dugdale, gave the manor of West Greenwich or Depeford, so called from the deep or passage through the Ravensbourne, to one Gilbert de Magminot.* On his great-grandson's death in 1191, without issue, the property passed to the sister and co-heir, Alice, wife to Geoffrey de Say, who gave it to the Knights Templars. That body subsequently exchanged it with his son for Saddlescombe, county Sussex. After a short sequestration Henry III. restored the property (1223) to the Sayes, who again enjoyed possession until the close of the fourteenth century. Passing through various hands the estate, on John Earl of Lincoln's death at Stoke (1487), became forfeit to the Crown. Thereupon Henry VII. gave it, in the year following, to Oliver St. John. But having reverted to the Crown, the property was seized by Parliament on King Charles I.'s death, and was sold, as valued at 1,650*l.*, in behalf of certain state creditors. Since the Restoration the manor has vested in the Crown, the stewardship being held in conjunction with that of Greenwich. The Browne family had long occupied the manor-house or Sayes Court. At the Parliamentary sale they received the Sayes Court site, together with about sixty acres, in lieu of their interest in the whole.† This grant included the Red House (latterly the Victualling Office), a wet and dry dock,—since Deadman's,—and a water-mill. But Sayes Court's chiefest fame rests upon its associations with the Russian Czar and the author of "Sylva." In 1647, at the Ambassador's Chapel, St. Germains, Evelyn married Mary, only daughter and co-heir to Sir Richard Browne, our minister in France. Sir Richard died, in 1683, in what Evelyn calls "my house at Sayes Court." Evelyn, it appears, first made Sayes Court his permanent residence in March, 1652, on his return from a tour in France; and laid out the celebrated gardens

* Compare the Sunderland suburb of this name,—on the river Wear,—where also are shipbuilding yards.
† Two hundred acres in all.

after the succeeding winter. In the Wotton MSS. is a detailed account of his operations, both building and horticultural, from which we gather that he planted the holly hedge, "even with the mount hedge below," in 1670. In the spring of 1683, he says, he planted all the garden out-limits and long walks with holly.* Peter the Great lodged here, at the sovereign's charges, in 1698. His domestic habits were the reverse of fastidious, yet for his reputed pastime of being dragged through quickset hedges in a barrow, the Czar does not seem to have chosen Evelyn's favourite rampart of holly. For in the "Sylva," lib. ii., cap. vi., occurs this passage,—"Is there under heaven a more glorious and refreshing object of the kind than an impregnable hedge of about 400 ft. in length, 9 ft. high, and 5 ft. in diameter, which I can show in my now ruined garden at Sayes Court (thanks to the Czar of Muscovy) at any time of the year glittering with its armed and varnished leaves, the tall standards at orderly distances blushing with their natural coral? It mocks the endless assaults of the weather, beasts, or hedge-breakers. *Et illum nemo impune lacessit.*" It is diverting to contrast Evelyn's solicitude for his garden with Pepys's references thereto. The latter, under date May 1st, 1665, mentions his visit "to Mr. Evelyn's, which is a most beautiful place, but it being dark and late I stayed not; but Dean Wilkins and Mr. Hooke and I walked to Redriffe [Rotherhithe]; and noble discourse all day long did please me."† On the 5th idem he writes:—"After dinner to Mr. Evelyn's; he being abroad [Evelyn was then busy with the care of some sick and wounded sailors, Dutch and English], we walked in his garden. A lovely noble ground he hath indeed, and, among other rarities, a hive of bees, so as, being hived in glass, you may see the bees making their honey and combs mighty pleasantly." Sayes Court was pulled down in 1728 and a workhouse erected in its stead. The garden site has been lately laid out by the owner as a parish recreation-ground. Other changes followed. The dockyard, established for ship-building in the year 1513, ceased to be used for that purpose in 1865 upon the introduction of armour-plated vessels, and was converted into a victualling-yard for the Royal Navy. One relic, however, had long been jealously kept,—the good ship *Golden Hind*, whereon Queen Elizabeth visited and knighted her great captain, Francis Drake. The state cabin was fitted up as a banqueting-house. A chair was ultimately made out of the woodwork and deposited in the Bodleian at Oxford. In March, 1869, Mr. J. P. Austin bought part of the old dockyard for 70,000*l.*, and sold it, with considerable profit, to the London Corporation for their foreign cattle market. This, however, was soon relinquished for the existing depôt of cattle landed from abroad. The hall of the Trinity House came down in 1787. That Company was founded by Sir Thomas Spert, Comptroller of the Navy to King Henry VIII., and Commander of the *Harry Grace de Dieu*, of which ship one or two faithful models may be seen in Greenwich Hospital.

Lovers of the picturesque in what we must now reckon as part and parcel with Greater London would do well to devote an hour or so to the by-ways and leading thoroughfare of Rotherhithe and Deptford. Few better views can be obtained than those presented by Wellington-street (formerly Flagon-row), conspicuous for its irregular wooden houses and quaint little bulk shops whose floors lie below the road level. Similar points of interest are to be found in Church-street,—notably the Three Compasses,—in Creek-road (*antiquè* New-road), together with Grove and New King streets, Deptford. Moreover, the streets which run southwards and eastwards have for distant background varied views of the Surrey and Kentish hills. Church-street, Rotherhithe, can boast of another curious bulk shop opposite to the Pavement, whilst of the many garden houses those in the neighbouring Paradise-row should not be overlooked.‡ Mr. Besant and his coadjutor, the late Mr. James Rice, laid most of the scene of their "Captain's Room" at the Seven Houses by Trinity Church, Rotherhithe. But it is to be observed that this name also belonged to a set of tenements which stood where the East London Railway passes underneath the Deptford Lower-road, near to the site of the old China Hall. Southwark Park absorbs the Mill Ponds and Halfpenny Hatch; Jacob's Island scarcely survives even in name.* Southwark Park-road represents the old Blue Anchor-road. The wide sluice at the northern end of Jamaica-level may possibly be the remains of the canal which was made to relieve the river's current on the rebuilding of London Bridge by Peter of St. Mary Colechurch, at the end of the twelfth century. That cutting is further supposed to have been laid in the course of the water-trench that Cnut opened for his abortive attack upon the citizens. Extending from the lower St. Saviour's Dock, Rotherhithe, to Lambeth, it passed through the multitudinous islets and the morass over which these low-lying parts of London have since arisen. The Jamaica Tavern, so renowned for its orchard, lay westwards of the new park, at the end of the now Cherry Garden-street. Hither Pepys would repair with his companions enlivening their passage by singing on the water. Cowley and the Earl of Nottingham, Queen Elizabeth's Lord High Admiral, lived in Deptford. Similar honours were conferred on Rotherhithe by Admiral Benbow and Swift, in the person of his Lemuel Gulliver; whilst such names as Hyde, Boscawen, and Hood streets perpetuate the memory of other naval heroes.

* The lease to him from the Crown was passed on the 30th of May, 1663. It was renewed for ninety-nine years, on the 12th of January, 1672, though a fee-farm had been promised under the king's engagement. See Wotton MSS.

† The party had spent the day with Colonel Blunt at his seat, Wricklemarsh, near to Charlton. Sir Gregory Page Turner rebuilt the house; this was sold in 1784; a set of chairs therefrom is preserved in the Soane Museum.

‡ Most of Paradise-row, where Prince Lee Boo lodged, at Captain Wilson's, is merged in Union-road.

* This wretched locality, familiar to readers of "Oliver Twist," lay, surrounded by ditches, in the area bounded by the present Mill-street (west), George's-row (east), Hickman's Folly (south), and the Thames (north).

RESISTANCE OF VESSELS.

ONE of the subjects referred to by Lord Rayleigh in his inaugural address at the meeting of the British Association at Montreal last month was the resistance to be overcome in the propulsion of vessels. Till within a recent period in modelling vessels attention was confined to the resistance offered by the midship section, and experiments were carried out with a view to discovering the best form which could be given to the entrance and run of ships, so as to reduce that resistance to a minimum. Before the application of steam to the propulsion of vessels there were elements affecting the modulus of stability which need not enter into the calculations of the present day, such as the height of the masts, the spread and weight of canvas, the angle at which the sails might be set, and the amount of freeboard necessary for ships liable to be heeled over at a considerable angle by the pressure of the wind in a hurricane on the heavy top-hamper which sailing-vessels are unavoidably obliged to carry. The relative dimensions of length and beam were then much less, and the lines of entrance and run, together with the best form of bilge suitable for cargo stowage or the disposal of a man-of-war's complement and stores, presented a very complicated problem for calculation. The proportion of mid-ship section to the wetted perimeter of a fully-laden ship was much greater than it is in the models of ships in the present day; and, consequently, the resistance offered by the vessel's surface appears not to have been considered, while even that of the angle to be given to the entrance and run-lines, both horizontal and vertical, appear to have been but imperfectly understood. The late Mr. John Scott Russell's interesting series of experiments which demonstrated the wave-line theory, and reversed the old lines by giving a double curve to the entrance and a single curve to the run led to great modifications in designing vessels, and to the increase of speed in that class of ships known as "clippers" which were used, prior to the introduction of steam, in the China trade, and which always commanded the highest freights,—carrying as they did the most valuable products so as to secure the earliest sales in the London market. With steam-propelled vessels, however, it became necessary to alter the models. The proportion of length to breadth became much greater, and that of the wetted perimeter became largely increased over the midship section. The substitution of iron for wood introduced also another element into the calculation,—for while the sectional resistance was much reduced by the adoption of finer lines, the total resistance was on the other hand greatly increased by the rougher surface exposed to the water. This new element, however, was not understood, though, as Lord Rayleigh pointed out, Professor Rankine, at a meeting of the British Association in Bath in 1864, surprised his listeners by asserting that he regarded skin-friction as the only legitimate resistance to the progress of a well-designed ship. The great importance of providing the smoothest surface possible for a vessel of the modern type of ocean-going steamers will be at once apparent from the fact that the resistance of painted iron has been found to be 1-15th lb. per square foot, while that of copper is only half as much, or 1-30th lb., at a speed of two miles and a half per hour. Taking one of the simplest models of steamers traversing the Suez Canal, say 400 ft. long and 40 ft. beam with a draught of 24 ft., the midship section would probably be about 850 square feet, but the wetted surface would be fully 30,000 square feet. If modelled on fairly fine lines the sectional resistance would probably not exceed 450 lb., while the surface friction (painted iron) would amount to 2,000 lb. at a speed of two miles and a half, as long as the surface remained smooth, but liable to be greatly increased when that surface became coated either with barnacles or any other substance. Lord Rayleigh observed that the nature of skin-friction is itself not well understood. This is quite true. Mr. Froude's experiments in this respect were by no means exhaustive, and there is much yet in connexion with surface-friction which has to be investigated. For instance, Lord Rayleigh is reported as saying that the resistance varies as the velocity. This point, however, has been by no means established; for at the higher speeds the ratio does not appear to continue constant. Moreover, it has been ascertained from other experiments that the surface-friction varies at different parts of the vessel, being greater at the bow than at the sides, and less still in the run; but the reason for these differences has not been yet explained. No doubt, in the words of the president, "it is connected with fluid viscosity, but the *modus operandi* is still obscure; but in spite of the difficulties which beset both the theoretical and experimental treatment, we may hope to attain before long to a better understanding of a subject which is certainly second to none in scientific as well as practical interest." There are symptoms of an increasing interest arising in the restoration of internal navigation. The projected ship canals, the improvements on some of the more important lines in England, the enlargement of the Ribble navigation, the improvements to the Aire and Calder, the discussion of an enlarged connexion between the Thames and Severn, and Bristol and London, are indications of a reviving appreciation of water-carriage, emphasised by the necessities engendered by foreign competition and home railway combination. An important factor in such navigations is, of course, the boats which have to ply thereon, and the more that their resistance can be reduced, the cheaper will be the cost at which they can be worked, and the greater the diminution in the charges for conveyance.

BICESTER.

WHATEVER may be the functions of a Rural Dean, we cannot be far wrong in supposing that their due exercise implies familiarity with the parishes of which the deanery is composed, and does not exclude a fair amount of literary leisure. It is pleasant to meet with a man who turns these opportunities to such good account as Mr. Blomfield has done in the book before us,* and we hope he may find many imitators in the ranks of the country clergy in Oxfordshire.

Bicester is best known in these days as the centre of a good hunting country, and there is not much in its outward appearance to distinguish it from any other Midland market town. There is the usual long street, through which in former days the mail-coaches between London and Birmingham were wont to rattle; the Market-place, from which the town-hall was carried away piecemeal by the mob in 1826, and the parish church, around which the history of the place for some 700 or 800 years centres. Bernecester (*unde* Burcester, Bissiter, and

* The History of Bicester: its Town and Priory. Compiled by Rev. J. C. Blomfield, M.A., Rector of Launton and Rural Dean. Bicester: Smith & Pankhurst. 1884.

Bicester) is mentioned in the Domesday Survey among the possessions of Robert de Oily, and had then an adult male population of 47, and two mills,—a fact which shows that then, as now, it was in the midst of a corn-growing district. The manor passed by marriage into the family of Bassett, and descended, through several female heirs, to William Stanley, 16th Earl of Derby. In 1596 he sold it to his own tenants,—thirty-one in number,—and thus the individual lordship of the manor has become virtually extinct.

The parish church,—replacing a Saxon structure which occupied the same site,—was built by Gilbert Bassett about the middle of the twelfth century; but the original cruciform plan was not carried out in its entirety. Chancel, transepts, and nave were finished, but the central tower was left incomplete. Its walls were raised high enough to carry the adjoining roofs, but the western arch was only indicated, and the work in the three existing arches was left very plain and void of ornament. The nave was extended to its present length, as three pieces of tooth-moulding, still *in situ*, forming the outer string-course of the north wall, show; and flat wooden roofs were employed throughout the fabric. Gilbert Bassett, the founder of the church, died in 1162, having spent most of his long life in the moated manor-house which he had built for himself at Berncestre. His grandson of the same name was yet more religiously inclined. Coming into possession of the manor in 1179, he immediately took in hand the establishment of a Priory of Augustinian Canons, and assigned the church to their care. The result of this was that the parochial fabric was neglected, and a century and a half elapsed before any addition was made to it. Then the southern wall of the nave was broken into, and an aisle of good Early English work added. Later on a north aisle was built in the Decorated style. The arches are recessed and chamfered and the pillars octagonal, with cap mouldings, and windows in the same style, were substituted for the small Norman lights at the east end and south side of the chancel. A century later the tower was erected, and the western door and window of Perpendicular work inserted. The tower, 75 ft. high, resembles so closely that of the neighbouring church of Islip that both must have been designed by the same architect, whose name has unfortunately perished. About the same period the roofs of the nave and transepts were raised, and the clearstory formed, and a little later the north porch, with a parvise above it, was added. Such is the architectural history of the fabric for three centuries and a half,—a history of growth both in beauty and use. Then follows the usual record of debasement and disfigurement. Pews and pulpit reigned supreme, and no less than six galleries were intruded between the arches of the nave and chancel. "Nothing," says Mr. Blomfield, "could have been seen in any church more unsightly and unbecoming than this chaos of uplifted boxes." It may be worth while to chronicle an eighteenth-century Archdeacon's notion of what was reqnired for the due preservation of a noble parish church like that of Bicester. The entry is as follows:—

"28 Sept., 1757.—A little under Pinning to be mended at the S.E. corner of the Chancel. The Church Porch to be whitewashed and the steps into the Church at N.W. door to be repaired. The pavement of the whole North Isle and at the S.E. corner of Miss Bosce's burying-place to be new laid, Plain and even: Bottoms of some of the seats to be repaired. A new cover to Font, new Chest, 3 locks and key; Church and Chancel to be whitewashed, 10 Comman[s] and chosen new Texts wrote." A little more than 100 years afterwards, viz., in 1862, the thorough restoration of the church after the plans of Mr. C. Beazley was effected, and St. Edburg's now presents a comely appearance, though the modern stained glass must be a poor substitute for that which filled the windows as late as 1660. No distinguished name occurs in the list of vicars of Bicester, but it must be borne in mind that after the prior and canons had taken their share of the ecclesiastical revenues the parochial minister had only a poor pittance left him, and that no augmentation was made when the priory was suppressed. That event took place in 1536, for Bicester was one of the lesser monasteries which were first despoiled. The king held the property only two years, and in 1542 it was sold by the Duke of Suffolk to Roger Moore, one of the serjeants of the royal household, who seems to have resided in the Hospice or Guests' House,—the only portion of the priory which now remains.

Mr. Blomfield gives the annals of the priory at considerable length, and has reprinted many of the deeds and account-rolls. From these one is able to gather not only a tolerably clear idea of conventual life, but also much valuable information about the cost of living in the fourteenth and following centuries. In the bursars' accounts, which begin with the year 1297, there are, of course, a good many items which seem to substantiate the charge brought against the monks of fondness for good fare. But the expenses were chiefly incurred for the entertainment of wealthy and powerful guests. If 9d. was spent upon "pork and larks," it must be remembered that they were "bought for the coming of the Lord Richard Daimari (Damory) and John Hubert," and against the item must be set "two sextaries of parchment of velym for the Prior's missal, 2s. 4d.; and ink and vermillion pounz and 'staungegreye' and other small things, 4d." Mr. Blomfield does not suggest any meaning for the last of these articles, and in many instances he is at fault in finding an equivalent for a monkish term. But the book, which, we understand, is only an instalment of a work which will include the parochial history of the entire deanery, is very creditable to the author, and deserves to meet with more than local support. The illustrations are scarcely up to the mark. The best, that of Burcester Hall (formerly Nun's Place), is taken from Dr. White Kennett's "Parochial Antiquities." Unfortunately the quaint house which it represents was pulled down at the end of the last century, sharing the fate of most of the older buildings in Bicester.

THE INTERNATIONAL FORESTRY EXHIBITION, EDINBURGH.

SEVENTH NOTICE.

ALONG the central avenue there are several stands devoted to the exhibition of wood pulps, and there are models of wood-grinding mills showing different modes of converting the wood into pulp. From early times the leaves and inner bark of trees have been used as writing materials, but it is only within the present century that the idea has been entertained of converting wood itself into a manufactured paper. In 1801 a patent was taken out in this country for such a purpose, but, like many inventions of this kind, it was some time before paper manufactured from wood became an article of commerce. The great and increasing demand for paper of all kinds, especially for the printing of newspapers, combined with the insufficient supply and consequently high price of rags and other fibrous stuffs from which the paper had hitherto been made, called greater attention to wood as a substitute. From experiments made it was found that the pine woods were the most suitable for the purpose; and about ten or fifteen years ago a fair start was made in this direction by German manufacturers, and the industry has since spread into Norway and Sweden, and Denmark, and now hundreds of thousands of tons are produced annually. There are three modes of converting wood into pulp, one of them by a mechanical process, the other two by means of soda and by the use of acids. By the mechanical process the wood is ground in water into small fibres, and is then partially dried. Mr. Carl Christenseen exhibits an excellent model of a wood pulp well driven by water. The logs are brought up to the saws by a lade, where they are cut into sections of from 1 ft. to 2 ft. in length; they are then barked and split by machinery, and by another process the knots are got rid of and the pith removed. By means of a hydraulic piston the material is held against upright grinding-stones revolving in water, which can be adjusted to produce either long or short fibre. The fibre is then carried by water to sieves, which check the passage of unground chips, while the strained material is passed on to a machine with an endless web, whence it issues in the form of large sheets. These sheets contain about 50 per cent. of water, which is squeezed out of them by hydraulic pressure, and the pulp is then ready for sale. In this state the price in London is about 3*l*. 10s. per ton. The wood used must not exceed twenty years of age, as thereafter it becomes hard and the fibre too brittle. The Germans prefer the Scotch fir, but in Scandinavia and Denmark the native pines are used. The preliminary process in the other two modes is similar to that adopted in the mechanical process. The wood, after being cut into small pieces, is boiled in water under high pressure, and is then treated under great heat with caustic soda or sulphuric acid, which extracts from it the resins and gums till it forms a pure cellulose mass, which is then washed and passed through breakers and rolled out upon a cylinder. To withstand the corrosive influence of the acid the iron boilers are lined with lead,—a section of such a boiler is exhibited. In the soda process a large percentage of the soda is recovered for after use by means of evaporation. Difference of opinion exists as to the superiority of these two processes, but the result appears to be equally satisfactory, the respective pulps being regarded as of the same value in the market. Large quantities of wood pulp are wrought up with other materials into papers of different qualities, but that produced by the mechanical mode having less tenacity than that made by the soda-and-acid process is only used for the commonest kinds. The different kinds of wood pulp are sometimes used in combination, and they are largely employed in the manufacture of cardboards, papier mâché, &c. This material may, in course of time, be in great demand for building purposes; it possesses great tenacity, may be moulded into various forms, and give a fine uniform surface. It is already used for ceiling and other decorations, but light and serviceable doors, well suited for the cabins of vessels, &c., may be made of it, and we have heard it recommended for roofing, either in large or small portions.

Another product of the forest which has now become an important article of commerce is indiarubber. This material was only known to the mass of the last generation as an article used for rubbing out pencil-marks and surface stains from paper, &c.; it is now extensively used for various purposes, and new uses for it are continually cropping up. The raw material varies in quality, there being no less than fourteen different varieties of indiarubber tree. Of these the most common is *Ficus elastica*, and one of the rarest is *Hevia Braziliensis*, from which latter the finest Para rubber is obtained, the tree itself being remarkable for the beauty of its foliage. The material is used both in its elastic and vulcanised form, and is, in a great measure, superseding leather for various purposes. Every bicyclist knows its value in mitigating the vibration of the wheels of his machine, and the engineer finds it invaluable for a similar purpose. The principal exhibitors of rubber products are Messrs. Thornton & Co., of Edinburgh, who have a stand at the extreme east end of the central avenue of the exhibition buildings, and a large glass pavilion in the adjoining grounds. Specimens of rubber in its crude state, as it issues from the tree, and in various stages of preparation for ultimate use, are shown. The adaptations of the material for waterproofing are illustrated, from the light material used for ladies' mantles, to the strongest as applied to shooting, fishing, and campaigning requisites. There are also examples of portable garden hose for conducting water to plants, foot-mats of various patterns, belts, and other surgical appliances, dolls, toys of various kinds, &c. The North British Rubber Company (Limited), who were the first to introduce the manufacture of vulcanised rubber into Scotland, exhibit an assortment of articles in this material as applied to machinery. As illustrating the adaptation of rubber to the production of heavy material, the company exhibit a traction-engine wheel tyre, measuring fully 4 in. thick, and 15 ft. 6 in. in diameter, which is stated to be one of the largest masses of the material yet produced.

A varied and miscellaneous collection of articles more or less associated with forestry has been contributed by a number of gentlemen interested in the subject. The first of these,—and not the least interesting,—which meets the eye is a case containing upwards of two hundred specimens of woodpeckers, contributed by Mr. R. G. Wardlaw Ramsay, of Whitehill. This useful bird is widely distributed, and ranges in size from that of a humming bird to a crow, and its plumage is as varied as its dimensions. There are only four species of woodpecker found in Britain, the most common of which, *Picus viridis*, is distinguished by its dark-green body and scarlet head and tuft. The plumage of the whole family is generally

brilliant and strongly contrasted. Mr. C. V. Riley, of the Department of Agriculture, Washington, contributes a case containing a collection of butterflies, moths, and beetles, with their larvæ which attack trees, and whose greatest enemy is the woodpecker. From examples taken from trees attacked by these grubs, it appears that the wood is riddled through and through, and it is stated that very few of the more common forest trees entirely escape their ravages. From Australia we have a singular natural curiosity in the shape of an example of *Sphaeria Robertsii*, which is produced thus:—One of the great Australian moths, while passing through its last stage of development, buries itself in the earth, where it is often attacked by a vegetable fungus which roots itself in the creature, sending up a long stringy shoot of about 9 in. in height. The roots fill up the skin of the larval moth, which remains intact, none of the fibres passing outside, so that when dug up the plant presents a very curious appearance. Other cases contain specimens of various birds, including specimens of white-tailed and golden eagles, sent by Mr. James Sargeant, of New Cumnock; and Mr. D. Johnston exhibits three specimens of the ant-eating armadillo.

Amongst the practical exhibits is a railway wagon frame, fitted up by Messrs. James Kennedy & Co., of Glasgow, to show white oak scantling in the kind of work for which it is employed. And with the object of demonstrating the suitability of the oak for such purposes, where strength is so necessary, there is also on view a number of pieces which were subjected to a series of bending and crushing strains by the well-known testing authority, Mr. Kirkaldy, of London. The oak scantling is sawn in the American forests to sizes required, which, besides giving better quality, effects a saving by having the wood sawn at the point where it is grown,—a saving which is immense as compared with the old system of importing logs, and having them sawn in this country. As showing the durability of oak, the same firm exhibit a table formed from the foundations of the old Stockwell Bridge, Glasgow, built in 1345, and taken down in 1850; and specimens are shown of *Lignid.mbar* wood, which till lately has not been used to any extent in this country, and which is beautiful in its colour and marking.

Another practical exhibit is contributed by Mr. James Dairsie Morrison, of Swanston, near Edinburgh,—a gentleman who has devoted much attention to the study of ventilation,—consisting of an ingeniously-constructed model of a forester's hut, which aims at providing within the space which can be afforded in such dwellings the most perfect conditions of healthy life. It may be recalled that at a meeting of the Highland and Agricultural Society, Mr. Morrison's system of ventilation came up for discussion, when his model of a "perfect stable" gained for him the Society's medal. The members of the British Association had also their attention twice called to the same subject by Mr. Morrison, whose papers were considered of sufficient importance to merit a place in the Transactions. Since then the matter has been further prosecuted; and the hygienic hut is part of the outcome of experiments which have been made. The principle embodied is that of maintaining in an apartment without creating an objectionable draught a continuous current or circuit of pure air. This air is made to enter at one end of the room treated, and to leave it at the other in a sort of drain underneath the flooring, which terminates in the flame chamber of a newly-invented oil-lamp stove used for heating purposes, where all impurities are consumed. The due admission of light is also made a feature of the scheme; and in the construction of the hut powerful and ingenious bracings have been introduced so as to prevent it from being injured by falling trees. A drying-shed, shown by the same exhibitor, claims to be an entirely new departure, inasmuch as it seeks to scientifically secure in one process the perfect drying of wood at a low temperature, with the no less perfect poisoning of all the conditions of low plant and animal life. Having regard to the fact that water evaporates at all temperatures, it is proposed to make heat do two distinct things simultaneously,—viz., to evaporate from the cells of the wood every trace of water, and, while doing so, to act as the carrier into the vacuum thus produced any amount of gaseous poison, such as carbonic acid, carbonic oxide, carbolic acid fumes, or other evaporable poison, which, though entirely harmless to the woody fibre, nevertheless fills every cell with a lining of poison against all low forms of life, and makes dry-rot a chemical impossibility.

The Queen has shown her interest in the exhibition by contributing a neatly-designed rustic châlet constructed entirely of the wood of the grand indigenous trees of the Balmoral forests, with beautiful specimens of the ancient Scots pine, both in a rough and polished state. The *Pinus sylvestris* at one time covered a large portion of the Highlands, and there are still some noble remains, notably on Speyside, Deeside, and the head waters of the Perthshire rivers. But nowhere may this picturesque tree, with its richly-coloured bark and deep green masses of foliage, be seen to more advantage than in her Majesty's forests, which cover about 20,000 acres of the romantic wilds of Upper Deeside. Some years ago the Ballochbuie Forest, where are some of the finest Scots pines in the country, passed into the hands of a firm of Aberdeen wood-merchants, who were proceeding to denude it of the choicest and most stately trees it contained. These proceedings were viewed by her Majesty with dismay, and by stepping in and purchasing the old forest, she put an end to the work of destruction. The old trees in Ballochbuie are now strictly preserved, and part of the ground is fenced in against the incursions of the deer so as to allow seedlings to come up and supply the blanks. By the gale which blew down the Tay Bridge, on the 6th of March, 1883, great havoc was committed in the forest, and the châlet now exhibited is formed from the wood of some of the trees then blown down. The interior is panelled with the polished heart-wood, which is beautifully grained, and the exterior of branches, bark, and moss collected in the forest. The châlet, with most of its furnishing, was made by the joiners at Balmoral, and the specimens show the adaptability of the wood for interior ornamentation and cabinet-making purposes, a table-top by Messrs. Allan, of Aberdeen, showing some very beautiful swirled graining. Over the entrance is the head of a royal stag, showing antlers with twelve points, and two other antlered heads are disposed at the ends of the ridge of the roof. On each side are placed specimens of the wood in a rough state. One of these, from Ballochbuie, is 270 years old, and another shows a girth of 212. This last specimen exhibits a peculiar and most interesting aspect. It had lain on the ground for upwards of forty years, until the sapwood had decayed and formed a thin stratum of soil where heather, cranberry and blackberry plants, and mosses have taken root; but the heart-wood, measuring 3 ft. 6 in. in diameter, remains perfectly sound.

An excellent exhibit of forestry subjects well worthy of notice, both from a botanical and practical point of view, is that of Messrs. Vilmorin, Andrieux, & Co., Paris, in the north-western transept. They have brought together quite a museum of dried specimens of plants, cones, and seeds, comprising upwards of 150 varieties of pinus, fifty different kinds of abies, and numerous specimens of araucaria, cupressus, juniper, and cedar. The collection of seeds includes samples of trees and shrubs from every region,—among others being the teak, mahogany, the eucalyptus, the indiarubber, and the cinchona, with seventy varieties of palms and over fifty varieties of oaks. Specimens of the most useful kind of eucalyptus, leaves, flowers, and seeds, are being shown; and as illustrating their rapid growth, there are displayed some stems of the *Eucalyptus globulus* (blue gum), and of the *Acacia dealbata*, grown on Mr. H. Vilmorin's estate in the south of France, which, although only two years old, measures 15 in. in circumference. There are also on the tables a few specimens of various acacia barks, which are now being largely used in place of oak bark for tanning purposes. The same firm also show some beautifully illustrated works on forestry, in English, French, and German. Mr. James Barrie, forester to the Honourable Mark Rollo, Stevenstone estate, Devonshire, also sends a well-arranged and representative collection of tree and shrub seeds, and cones, and sections of timber grown on this extensive property.

Cost of Maintaining Three London Bridges.—The cost of lighting, cleansing, and repairing London Bridge, for the past year, was 1,267*l.*; Blackfriars Bridge, 1,292*l.*; Southwark Bridge, 2,467*l.*, including 624*l.* for relaying new channelling to approaches.—*City Press.*

THE LATE WILLIAM PETTIT GRIFFITH.

WE much regret to announce the death of this gentleman, which took place on Sunday afternoon last, the 14th instant. William Pettit Griffith was the son of Mr. John William Griffith, architect, who was a resident in St. John's-square, Clerkenwell, for half a century. The subject of our notice was born July 7th, 1815, and was brought up in the profession of an architect. Although upwards of seventy years of age, Mr. Griffith had only just retired from the profession, after incessantly labouring in it for fifty-three years. He retired from his professional residence in Guilford-street, Russell-square, in June last, and died at his new home, at 3, Isledon-road, Hornsey-road, Highbury, on Sunday last, as above stated. Mr. Griffith was elected a Fellow of the Society of Antiquaries in 1841, a Fellow of the Royal Institute of British Architects in 1847, honorary member of the Bedfordshire Architectural Society in 1847, honorary member of the Liverpool Architectural Society in 1849, and honorary member of the Surrey Archæological Society in 1856. In 1854 he obtained, in a competition, the silver medal of the Institute of Architects. Mr. Griffith was the author of the following works:—"Grecian Architecture: Suggestions for Developing," "Natural System of Architecture," "Mediæval Architecture: Ancient Gothic Churches," and "Architectural Botany."

The following were among the papers communicated by Mr. Griffith to various Societies:—In 1852, to the Royal Academy of Belgium, "On the Proportions of the Temple of Vesta at Tivoli"; 1852, the Bedfordshire Architectural Society, "Suggestions for a more Perfect and Beautiful Period of Gothic Architecture"; 1855, Royal Institute of British Architects, "On the Principles to be observed in Designing Mediæval Decorations and Ornaments with reference to the Sources of Ornament offered by the Natural Kingdom"; 1857, the Liverpool Architectural Society, "Proportion, its Practical Application to Architecture and the Fine Arts"; 1863, the same Society, "Of the Influence of Fashion in Architecture"; 1854, the Surrey Archæological Society, "On the Ancient Baptismal Fonts of England"; 1858, the same Society, "An Architectural Notice of the Nave of St. Saviour's Church, Southwark."

Among the works which he has designed and superintended are Ogle-mews Ragged School, for Sir R. W. Carden, 1862; Lamb and Flag Ragged School, 1861; the Goldsmiths' and Jewellers' Annuity Institution Asylum, South Hackney, 1853; new schools, Highgate, for Clerkenwell Guardians, 1858; restoration of St. John's Gate, Clerkenwell, 1845-6; rebuilding spire of St. James's Church, Clerkenwell; Vestry-hall, Clerkenwell, 1857; Royal Hospital for Incurables, West Hill, Putney Heath (the foundation-stone of which was laid May 11th, 1864); an illustration and description of this building appeared in the *Builder*, vol. xxiii., p. 118, Feb. 18th, 1865. Restoration of tower and porch of St. Sepulchre's Church, Holborn, and various other works.

The Theatre Royal, Edinburgh.—Plans and specifications have now been prepared, and estimates received, for the reconstruction of the Theatre Royal, which was destroyed by fire on 30th June last. Mr. C. J. Phipps, of London, who designed the ill-fated building, is the architect for the new building, and his plans show that the new theatre will be built very much on the same lines as its predecessor. Several new features are to be introduced, however, which are calculated to add to the safety and comfort of playgoers. First of all, increased facility is to be afforded on the higher levels of the building for entrance and egress by providing an additional staircase. The wall dividing the stage from the auditorium is to be of solid brickwork, and is to be carried up through the roof of the theatre; while all apartments of the nature of workshops and other necessary rooms are to be erected outside the main building. Last, but not least, the ventilating arrangements are to receive careful attention. As already indicated, tenders have been given in for the reconstruction of the theatre, which Mr. Phipps has undertaken to have completed by the beginning of the pantomime season. As to cost, it is expected that this will be covered by the insurances on the old building, which amounted to 12,500*l.*

Illustrations.

DESIGN FOR WAR OFFICES.

BY MESSRS. GLOVER AND SALTER.

WE give this week the design by Messrs. Glover and Salter as submitted in the second competition. The illustrations show the proposed front to Whitehall (from a much more distant point of view, however, than would have been possible in reality), and, as in the other cases, the plans of the two principal floors. The open areas, it may be noted, are in this plan increased in size at the upper levels, and are ventilated by an open subway below the basement; and the corridors are lighted not only from these open areas, but receive direct light at the staircases and the messengers' rooms. The design is a powerful one in some respects, and takes a very good place, architecturally, among the nine; but, bearing in mind the fact that architecture is now a succession of fashions, there can be little doubt that at the present moment it is what in fashions would be called "out of date." No blame to the authors for employing the style they prefer; but there could have been little chance of a purely Gothic design finding acceptance, so quickly in these days does the whirligig of time bring in his revenges.

The following extracts from the Report of the architects will assist in explaining their views in the design:—

"The buildings show two distinct façades in Whitehall for the Admitalty and War Office, connected in front by open covered corridors and arcading, so that, although they are thus united and form one continuous building in the rear, the two offices can be separately identified on the main front. The proposed new street between the Admiralty and Biddulph's Bank is for convenience, and to isolate the buildings.

There are three courtyards behind the Whitehall front, and one grand quadrangle behind the Park fronts. Three great carriage entrances are provided towards Whitehall, and one, generally kept closed, in the west (Park) front; and there are carriage porches in the quadrangle. It will be noted that the centre quadrangle gateway is opposite the middle of the Admiralty Whitehall façade, and the two side gateways are,—the one opposite the centre of the War Office courtyard, and the corresponding one opposite the new street. Carriages can enter at the centre gate in Whitehall, and go out by the side gates, either to Whitehall or to St. James's Park, or *vice versâ*. It is thought that the gateway in the park front would serve as a central feature of that long elevation, and also that it would be of value in giving a glimpse of the trees in the park to passers-by in Whitehall and in the quadrangle.

It has not been thought necessary to adhere to the style of the Horse Guards, which building is probably inadequate to its future requirements, and which is so much lower than the new offices that an attempt to match the two would be a failure. For that and the following reasons a Mediæval style of the best period has been adopted:—(1) For contrast with the Foreign Offices; (2) for picturesqueness of outline; (3) for the greater number of window-openings available; (4) because it combines the characteristics of a castellated style with the conveniences and enrichments of palatial and domestic architecture, and so appears suitable for the War Offices of a nation. Thus in the accompanying design the turrets and machicolated cornices, and the great central tower or 'keep' present an appearance and character consonant with the purpose of the building, while each serves its own purpose of use or ornament, the 'keep' being utilised in floors of repositories, and the other towers similarly applied for the departments near them.

In further justification of the choice of a Mediæval style, it may be pointed out that in this design the rooms are well lighted and without slanting sides or awkward corners; the corridors are wide, straight, level, and well lighted, and the staircases are easy and absolutely without winding steps; although Gothic architecture is erroneously supposed to be incompatible with convenience of plan.

Again, if it be asked what modern English public building has given most content and satisfaction to the nation, it can scarcely be doubted that the Houses of Parliament would be named. It is true that the Law Courts are considered to fail in internal arrangements and in external unity; but this is not the fault of Gothic architecture: as stated above, this style is no bar to convenience of plan; and the elevations and perspectives of the accompanying design show that by proper use of horizontal as well as vertical lines, unity, grandeur, and stability can be well expressed in this most pure and beautiful style.

The walls should be faced with Portland, Ancaster, or similar stone, externally, and with white glazed bricks in the areas, and the roofs slated. The floors would be iron joists and Portland cement concrete, covered with tiles in the corridors and with wood in the rooms for comfort.

All the important rooms on the first floor open on to the balconies. It will be noticed that the waiting and 'Interview, or Clerks',' rooms are very numerous, one to every head of department or high official. Besides the public corridors, 10 ft. 6 in. wide, private corridors, 4 ft. 6 in. wide, are provided to all the most important rooms on the first floor, so that communication between the chiefs and their heads of departments can be made in absolute privacy. Both sets of corridors will be well lighted and ventilated by the numerous open areas between them.

The retiring-rooms are arranged in accordance with modern ideas of comfort and convenience too often neglected. Each contains one water-closet or more, with a window to the open air; also a lavatory and lobby, which have other opening windows besides those in the water-closets above the water-closet framing. The retiring-rooms are entered, not from either corridor, but from the short lobbies or staircase landings connecting the two corridors on the first floor, or leading to room son the other floors.

No special or particular system is advocated either for heating or ventilation; any approved scheme could be adopted, as the 2 ft. thick floors and the great amount of spare room in the towers and basement supply more than adequate space for any required apparatus."

As before, we print the key list of references to departments, which will apply also to the other design mentioned below.

Key to References on Plans.

THE WAR OFFICE.

A. Staff.
B. Surveyor-General's Department.
  B 1. Director of Artillery.
  B 2. ,, Supplies.
  B 3. ,, Contracts.
  B 4. Inspector-General of Fortifications.
C. Central (or Secretary of State's) Department.
  C 1. ,, ,, ,,
  C 2. ,, ,, ,,
  C 3. ,, ,, ,,
  C 4. ,, ,, ,,
D. Finance Department.
  D 1. Finance Department.
  D 2. Auditors.
E. Military Department.
  E 1. Military Secretary.
  E 2. Adjutant-General and Quartermaster-General.
  E 3. Intelligence Department.
  E 4. Deputy Adjutant-General R.A.
  E 5. Deputy Adjutant-General R.E.
  E 6. Army Medical Department.
  E 7. Military Education Department.
  E 8. Commissary-General's Department.
  E 9. Principal Veterinary Surgeon's Department.
F. Miscellaneous.
  F 1. Army Purchase Commission.
  F 2. Judge Advocate General.
  F 3. Pay Office. Commissariat and Transport and Ordnance Store Corps.
  F 4. Pay Office. Army Hospital Corps.
  F 5. Army Sanitary Committee.

THE ADMIRALTY.

A. Board-room Suite and Secretary's Department.
  A 1. Board-room Suite.
  A 2. Military Branch.
  A 3. Intelligence Branch.
  A 4. Naval Branch.
  A 5. Civil Branch.
  A 6. Legal Branch.
  A 7. Registry Branch.
  A 8. Record Office Branch.
  A 9. Copying Branch.
B. Hydrographer's Department.
C. Transport Department.
D. Victualling Department.
E. Controller's Department.
  E 1. Director of Naval Construction.
  E 2. Engineer-in-Chief.
  E 3. Director of Naval Ordnance.
  E 4. Store Branch.
  E 5. Dockyard, Ship, Gunnery, and Registry and Copying Branches.
F. Accountant-General's Department.
  F 1. First Division.
  F 2. Second Division.
  F 3. Third Division.
  F 4. Fourth Division.
  F 5. Fifth Division.
  F 6. Sixth Division.
  F 7. Greenwich Hospital Division.
  F 8. Auditors.
G. Director of Contracts Department.
H. Director of Medical Department.
J. Director of Works Department.
K. Naval Reserves Department.
L. Royal Marines Department.
M. Inspector of Naval Schools Department.

DESIGN FOR WAR OFFICES (FIRST COMPETITION).

BY MR. T. G. JACKSON.

THIS very elegant and tasteful design, the merits of which would no doubt have come out far better in detail, had the architect been commissioned to present it on the larger scale and with the more complete drawings admitted by the second competition, partakes a good deal of the feeling of the modern manner of London building which has been supposed to have more or less relation to "Queen Anne," or to have arisen from a preference for Late English Renaissance. The author's note in regard to style in his Report is as follows:—

"A Gothic style would not be suitable either to the site or the purposes of the building, and pure Palladian Classic would be still less fitted for a structure consisting necessarily of several low stories and an infinity of small windows. I have adopted the freer style of the English and German *Renaissance*, and thus avoided the necessity of running the Classic order through two stories of the building, an absurdity seldom committed by the best masters of the *Renaissance* in any country, though common enough in our own."

Though we regret the adoption, by several able architects of the day, of some of the less admirable features of the old London brick style, such as the curved pendent ornaments (?) beneath the window-sills, which are ugly in themselves and architecturally unmeaning, we have no doubt that, if carried out, this would have been a building presenting much very pleasing detail, and a general aspect of architectural refinement. But we should very much doubt if it would generally have been taken by visitors for the War Office. It is a great deal too quiet and domestic-looking to convey any such idea. The plan is very symmetrically arranged for intercommunication, but some of the corridors could hardly, we should imagine, have been sufficiently lighted. We append the following remarks from the author's Report:—

"In order to secure ready circulation throughout both offices, I have avoided very large quadrangles, and the plan has fallen naturally into a form very like that suggested by her Majesty's First Commissioner in the article published by him in the *Nineteenth Century* for November, 1882. The public entrances to both offices would be from Whitehall by large archways leading into the smaller quadrangles of the War Office and Admiralty respectively. Each office has a large waiting-hall opening from this quadrangle, and I have placed these, not on the side next the street, but in the interior of the building, tolerably central with reference to all the departments. The public will consequently have no occasion to traverse an unnecessary number of corridors, but can be taken straight from a common centre to the department they are in search of. They need never use more than two of the staircases provided for each office, and the other staircases can be reserved exclusively for the use of officials and persons on special business. The rooms of the chief officials are farthest from the general entrance, and need never be approached at all by the public. The corridors into which the rooms of the Admiralty Board and those of the chief officials of the War Office open are continuous, and those rooms form one suite facing St. James's Park.

There is a similar communication on each floor between the two offices at each of the three points where they touch, except on the upper floor of the Whitehall front, where it did not seem to me necessary.

Height of Stories.—In a building consisting of so many rooms of moderate size, seldom larger than those of a private dwelling-house, it has seemed to me that to exceed the height usually given to rooms of that size would make them ill-proportioned and uncomfortable. The average size of the single rooms is about 20 ft. by 17 ft., and the best proportionate height for such a room would be from 13 ft. to 14 ft. on the principal floors to 12 ft. on the top floors, to which dimensions I have accordingly confined myself, except in the case of the Board-rooms and those of the First Lord, the Secretary of State, and the Commander-in-Chief, which are higher, and the entrance-hails, which occupy two stories in height. I may add that I do not think a very lofty building would have a good effect in this situation. Inigo Jones's Banqueting House measures only 67 ft. to the eaves, and the Horse

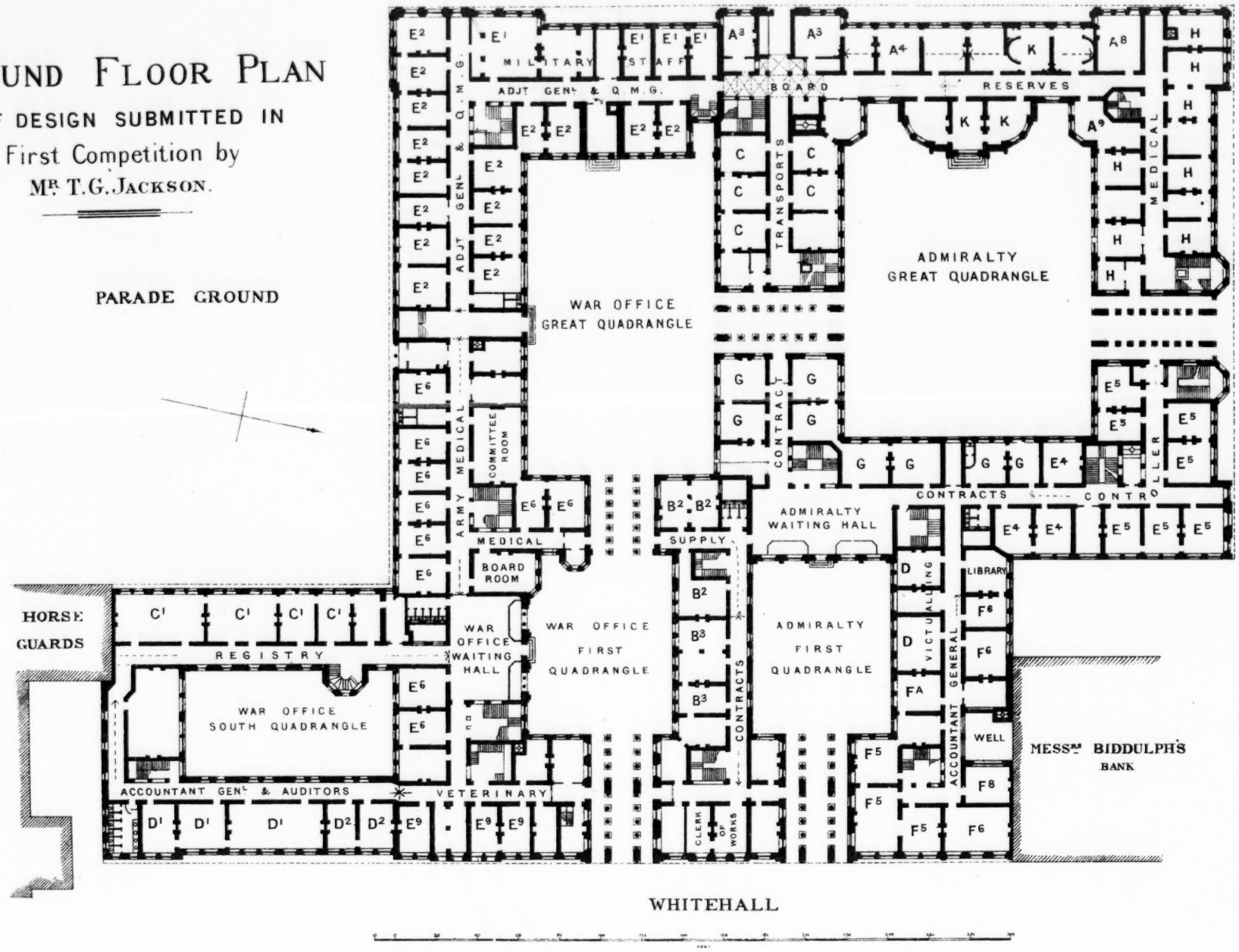
NEW ADMIRALTY AND WAR OFFICE.

GROUND FLOOR PLAN

OF DESIGN SUBMITTED IN
First Competition by
MR T.G. JACKSON.

PARADE GROUND

ST JAMES'S PARK



C.F Kell Photo-Lith & Printer 8 Castle St Holborn London E.C

DESIGN FOR NEW ADMIRALTY AND WAR OFFICE.

GROUND PLAN.

BY MESSRS. GLOVER & SALTER.

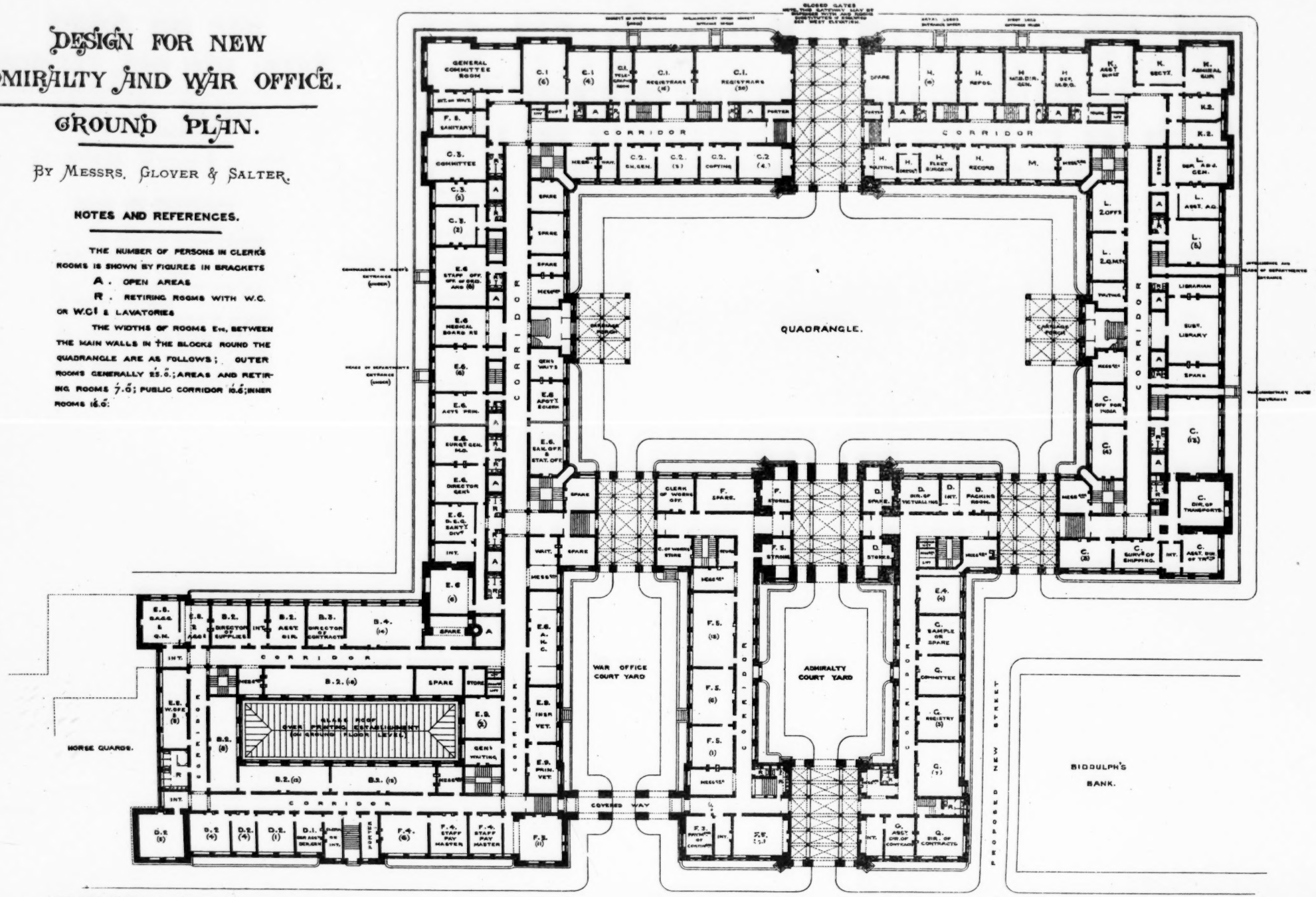
NOTES AND REFERENCES.

THE NUMBER OF PERSONS IN CLERK'S ROOMS IS SHOWN BY FIGURES IN BRACKETS

A. OPEN AREAS

R. RETIRING ROOMS WITH W.C. OR W.C.'S & LAVATORIES

THE WIDTHS OF ROOMS &c., BETWEEN THE MAIN WALLS IN THE BLOCKS ROUND THE QUADRANGLE ARE AS FOLLOWS; OUTER ROOMS GENERALLY 25'.0"; AREAS AND RETIRING ROOMS 7'.0"; PUBLIC CORRIDOR 10'.6"; INNER ROOMS 16'.6".



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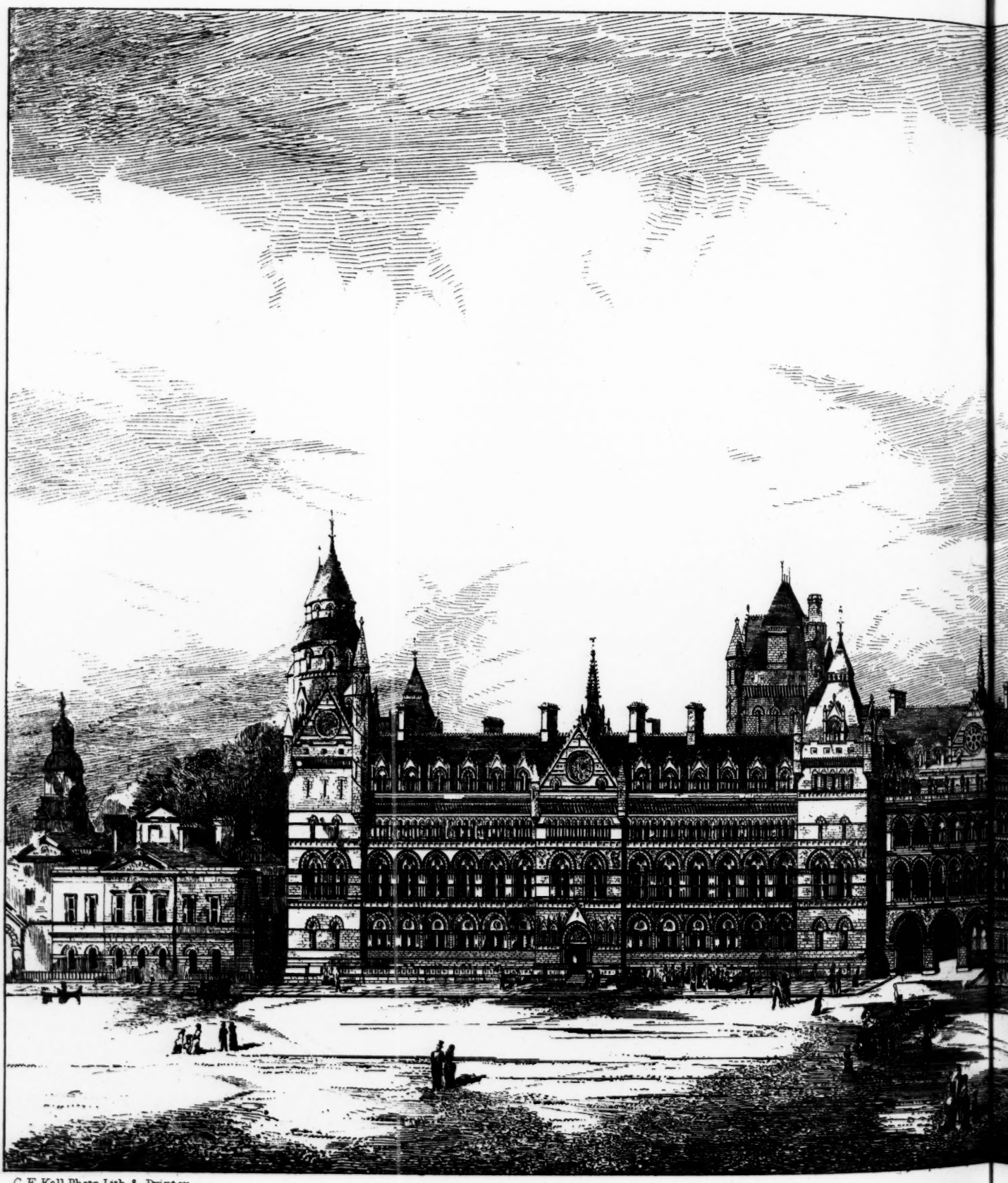


C. F. Kell Photo-Lith. & Printer.

DESIGN FOR NEW ADMIRA

By Messrs. Glover

Front to Wh

8, Castle St Holborn, London, E.C.

IRALTY AND WAR OFFICES.

GLOVER AND SALTER.

at to Whitehall.

DESIGN FOR NEW ADMIRALTY AND WAR OFFICE.

FIRST FLOOR PLAN

BY MESSRS. GLOVER & SALTER.

NOTES AND REFERENCES.

ALL IMPORTANT ROOMS ON THIS FLOOR HAVE BALCONIES.

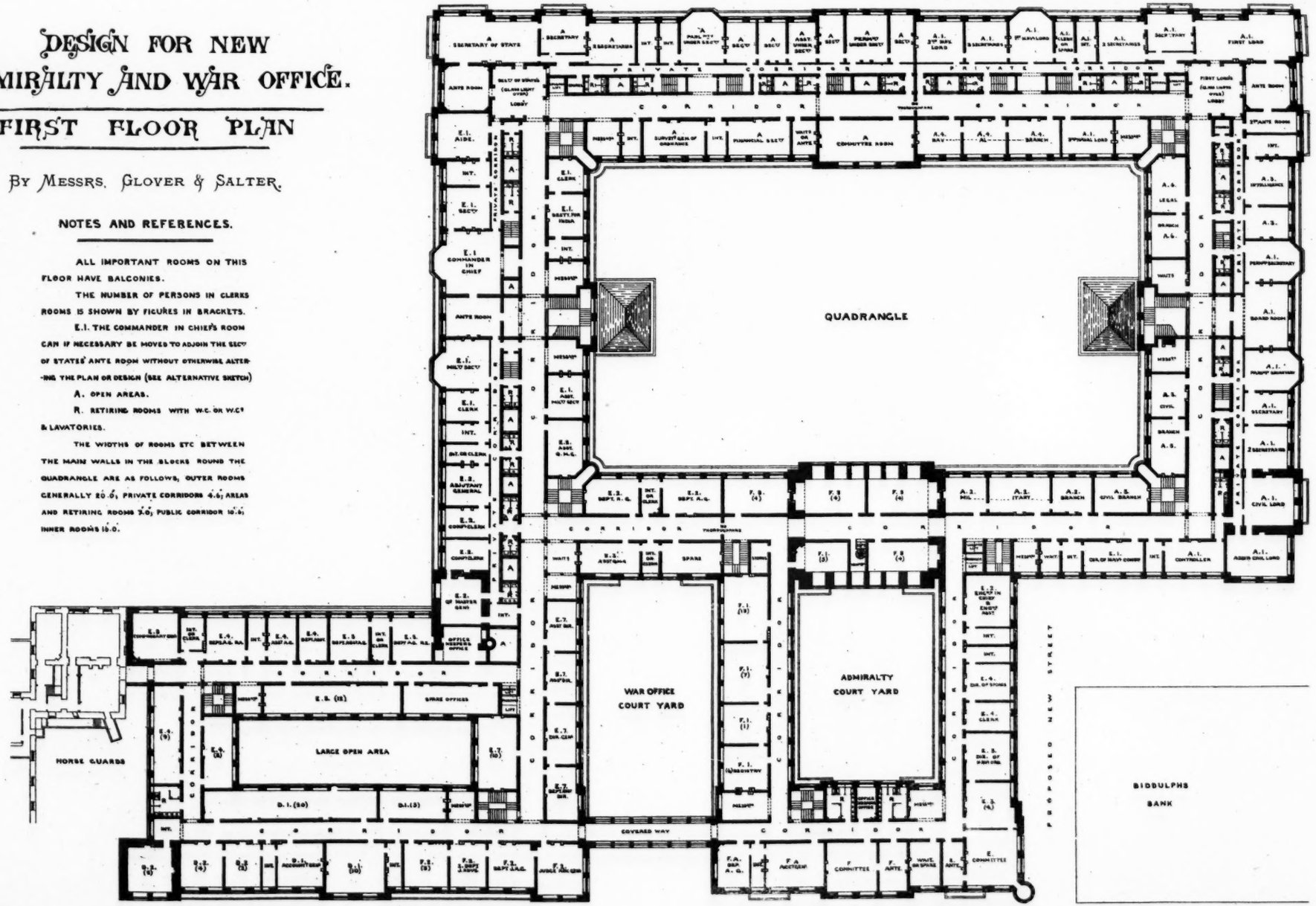
THE NUMBER OF PERSONS IN CLERKS ROOMS IS SHOWN BY FIGURES IN BRACKETS.

E.1. THE COMMANDER IN CHIEF'S ROOM CAN IF NECESSARY BE MOVED TO ADJOIN THE SEC^y OF STATES' ANTE ROOM WITHOUT OTHERWISE ALTERING THE PLAN OR DESIGN (SEE ALTERNATIVE SKETCH)

A. OPEN AREAS.

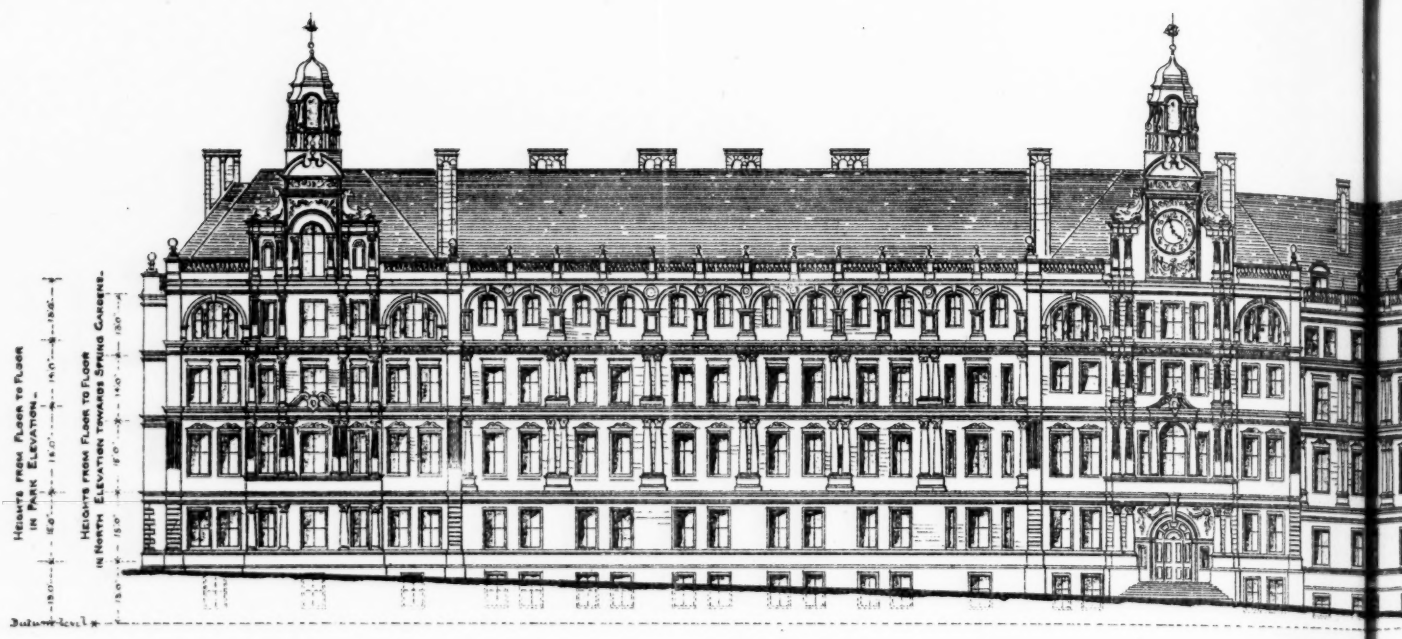
R. RETIRING ROOMS WITH W.C. OR W.C^s & LAVATORIES.

THE WIDTHS OF ROOMS ETC BETWEEN THE MAIN WALLS IN THE BLOCKS ROUND THE QUADRANGLE ARE AS FOLLOWS, OUTER ROOMS GENERALLY 20'.0"; PRIVATE CORRIDORS 6'.0"; AREAS AND RETIRING ROOMS 5'.0"; PUBLIC CORRIDOR 10'.0"; INNER ROOMS 15'.0".



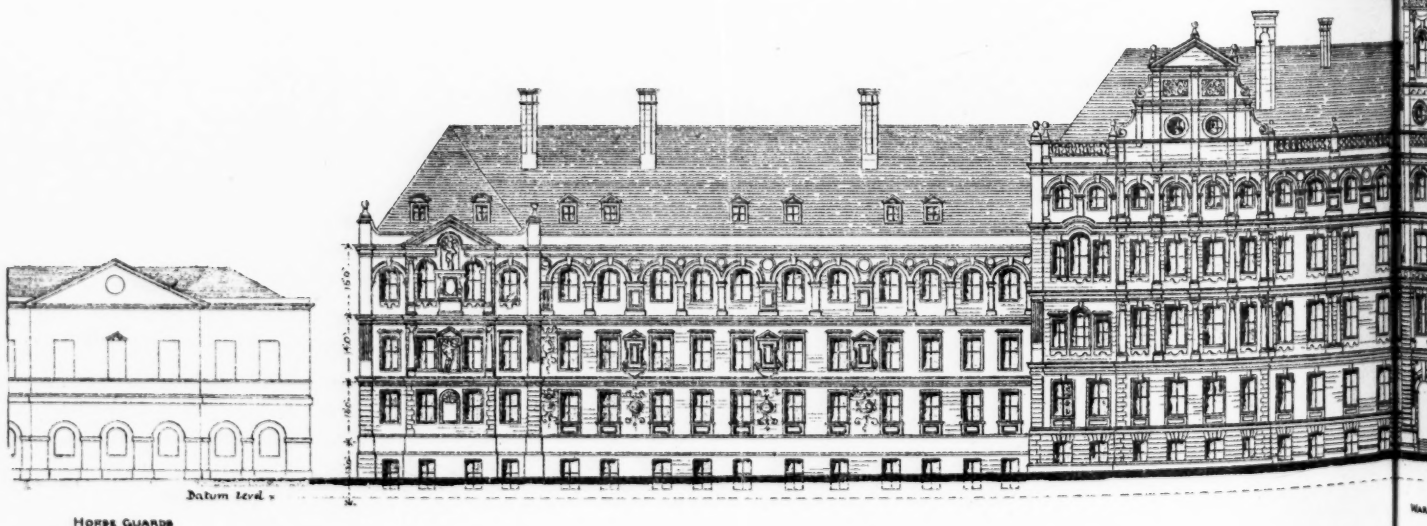
SCALE. 16 FEET TO 1 INCH.

Wyman & Sons, Photo-Litho. Gt Queen St London, W.C.


Heights from Floor to Floor in Park Elevation.
Heights from Floor to Floor in North Elevation towards Spring Gardens.
Datum level.

ADMIRALTY

ELEVATION TOWARDS ST JAMES'S PARK



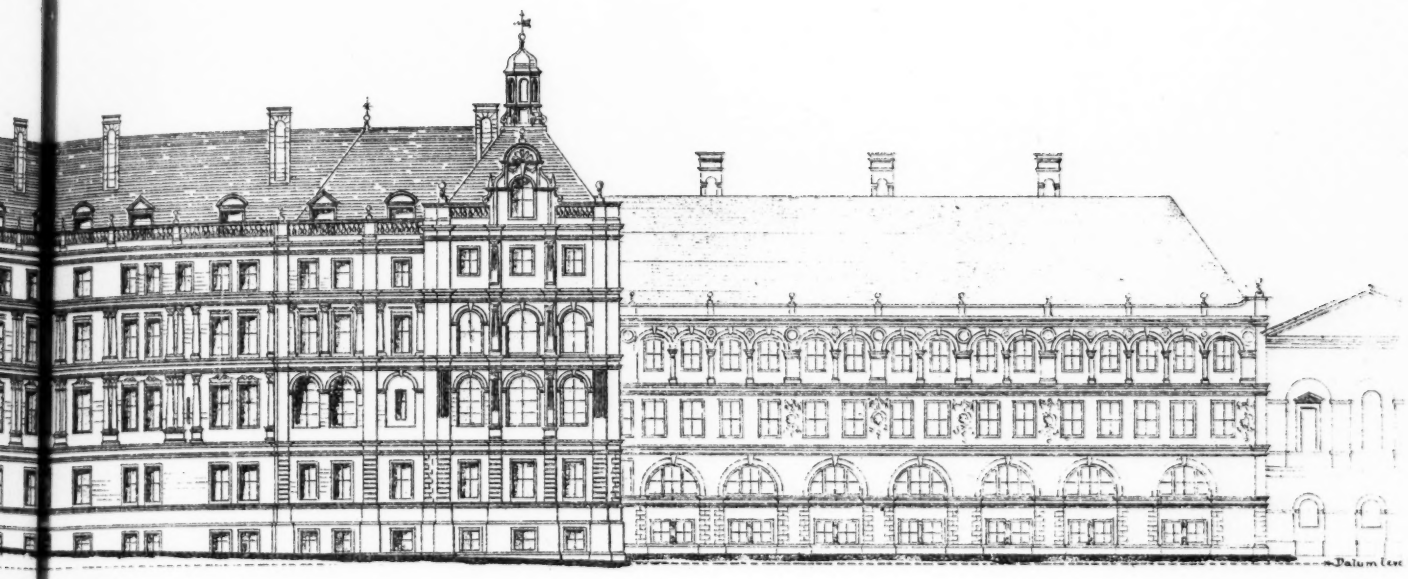
HORSE GUARDS
TO SCALE.

ELEVATION TOWA

DESIGN FOR WAR AND ADMIRALT

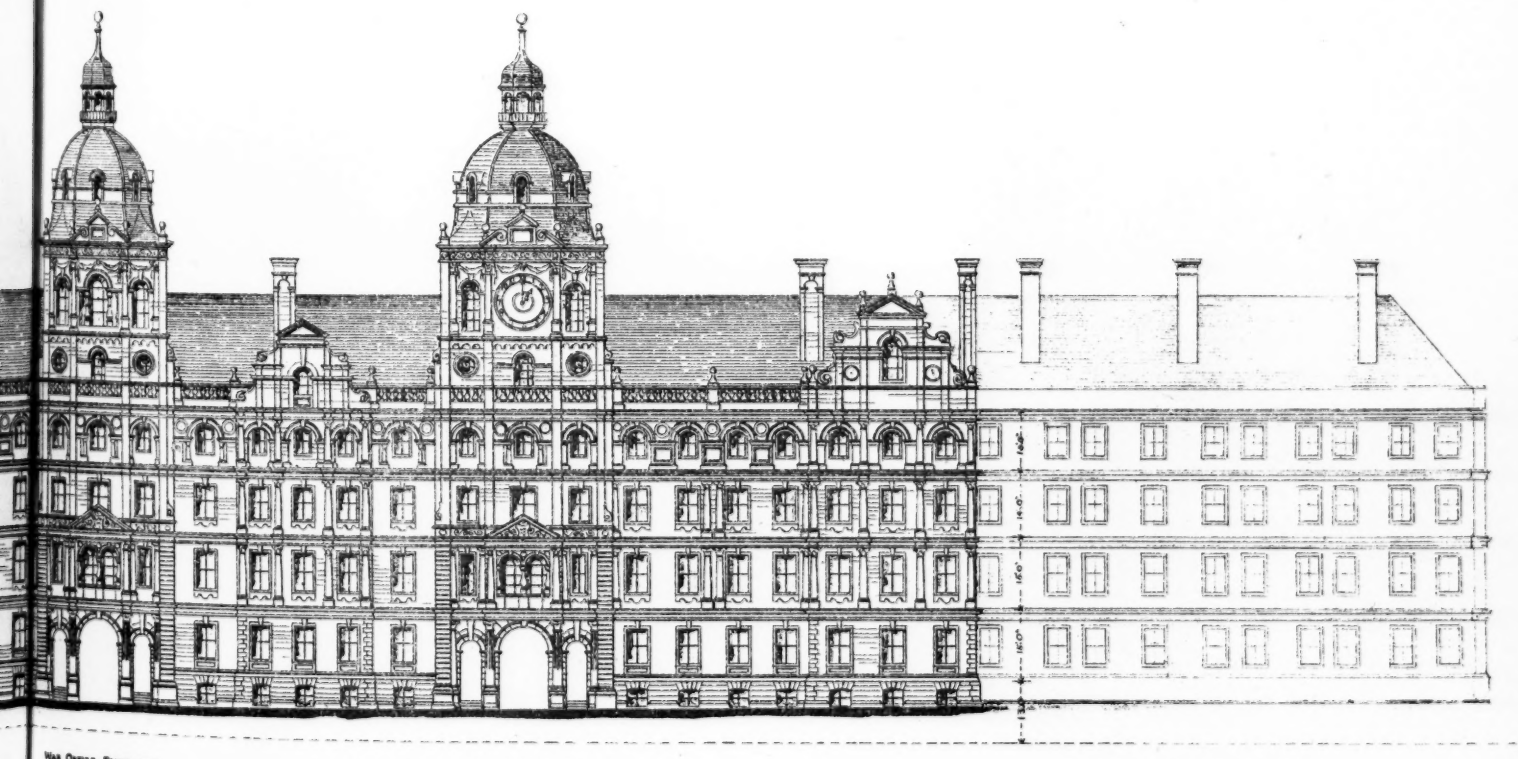
By Mr. T. C

C. F. Kell Photo-Lith & Printer



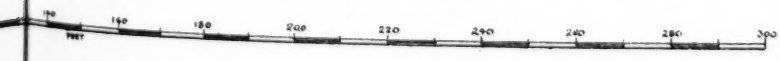
WAR OFFICE — RECEDES 282 FEET — HORSE GUARDS

R PARK



WAR OFFICE ENTRANCE — ADMIRALTY ENTRANCE — RECEDES 14-6 FEET 6 INCHES, AND IS HIDDEN BY MESSRS BIDDULPHS BANK.

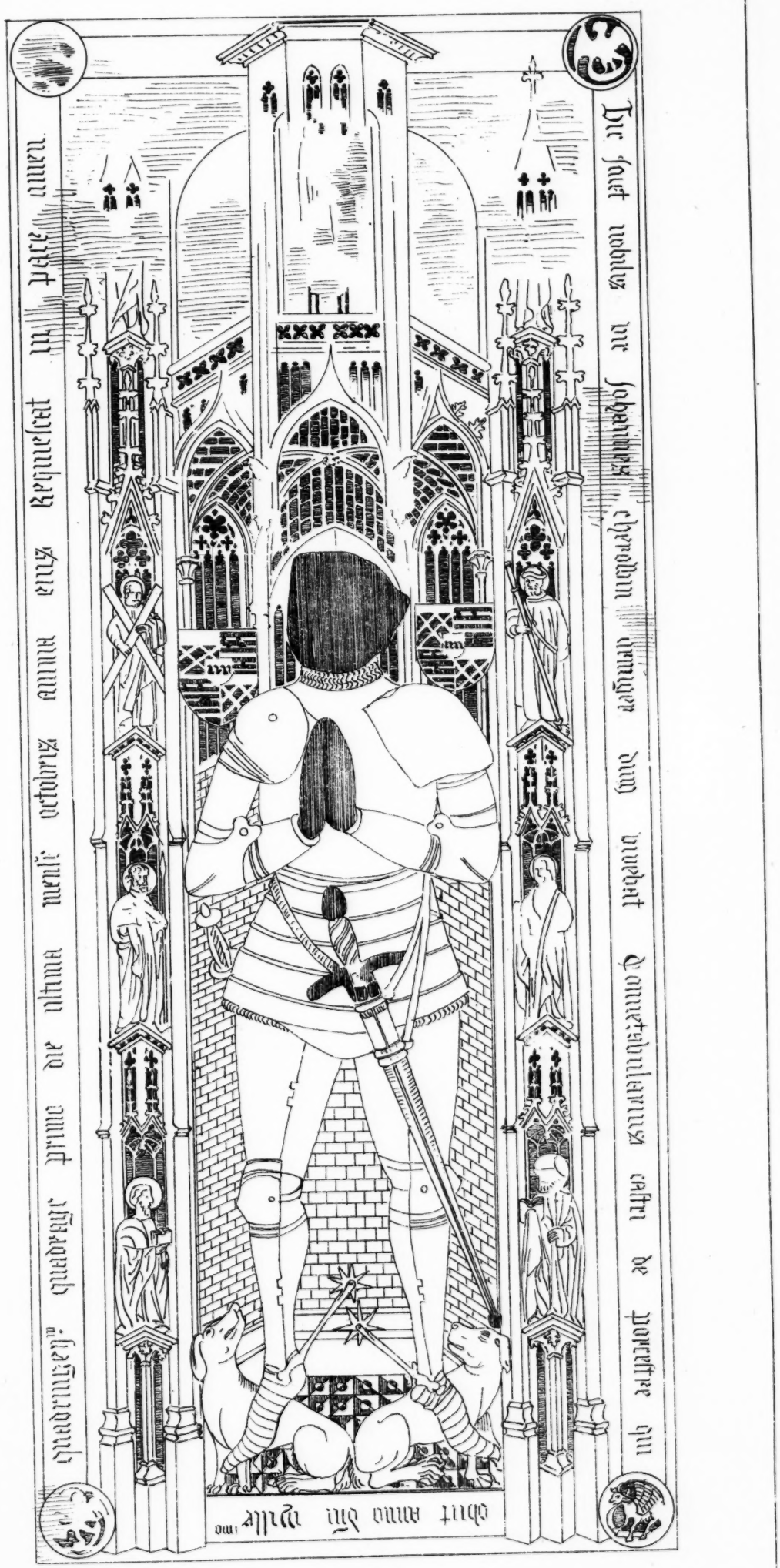
ON TOWARDS WHITEHALL.



MIRALTY OFFICES (FIRST COMPETITION).

R. T. G. JACKSON.

8. Castle St. Holborn. London. E C


Dir fact wohls vr Johannes vr
Qui cum quadraginta
Quinquaginta cetri de Dorcestre du
obiit anno dñi mille
quadringen. quadrage prime die vltima menſ
anim eius Requiescat in pace amen

1 foot

INCISED SLAB
BRADING CHURCH Isle of WIGHT

Plo Paul del. 1884.

C.F. Kell Photo-Lith & Printer 6 Castle St Holborn London E.C.

Guards is comparatively a small building. I have shown the latter to scale on my elevation that the relative size of my design may be appreciated.

Construction.—The walls would be of brickwork with dressings of best selected Portland stone. In the interior of the quadrangles I should propose to face part of the walls between the dressings with rubbed brickwork, which has an admirable effect mixed with Portland stone. The exterior fronts will probably be best faced chiefly with stone, though even there some brick facing might be employed with advantage. It is, however, impossible to study this to so small a scale as that of the present drawings."

INCISED SLAB, BRADING CHURCH, I.W.

THE slab here illustrated is one of the finest of its kind in England. It is situated in the chancel of the altar, and measures 8 ft. in length, and about 3 ft. 6 in. in breadth. The centre is occupied by the figure of John Cherowin, constable of Porchester Castle, who died in 1441. He is represented in plate armour, with a long sword hanging from the left side, and a dagger visible on the right. The feet rest on dogs, and have remarkably long spurs with rowels. The head, hands, and some of the ornamental parts of the sword hilt and scabbard were formerly inlaid with stone or metal, probably the latter. There is a tradition that the inlay consisted of silver. The figure stands underneath a vaulted canopy, with tracery in the upper part, and brickwork below. Against the tracery, one on each side of the head, are two shields, which are charged apparently with the following arms:—Quarterly, 1st and 4th fretty, a chief; 2nd and 3rd barry of twelve, three martlets. Over all, on an inescutcheon, four martlets.

On each side of the figure rises a tier of canopied niches with pinnacled buttresses. There were formerly eight figures, but only six remain at all perfect. Of these SS. Andrew, Lambert, Peter, and James can be made out, but the other two are somewhat obscure. The lowest on the right holds a book. At the top over the centre of the canopy was the Virgin and Child. Some slight traces of drapery alone remain, and the figures which flanked this niche have entirely disappeared. At the angles are the evangelistic symbols, of which two remain. The inscription is marginal, and runs round three sides of the stone. It is as follows:—"Hic jacet nobilis vir Johannes Cherowin armiger dum vivebat Connetabularius Castri de Porcestre qui obiit anno Domini millesimo quadringesmo quadrago primo die ultima mense Octobris anima ejus requiescat in pace. Amen." The elaborate details, especially the masonry background, seem to point to the fact that this fine monument is of foreign workmanship.

The drawing has been reduced from a rubbing, and carefully drawn to scale.

R. W. PAUL.

THE TRADES' UNION CONGRESS.*

WE now bring to a close our notes of the proceedings of the Aberdeen congress of trade unionists.

The Employers' Liability Act.

At the afternoon sitting on Tuesday, the 9th inst., Mr. Woods (cotton-spinner) moved,—

"That this Congress regrets that Parliament has not yet consented to pass the Bill, introduced by Mr. Burt, M.P., Mr. Broadhurst, M.P., and others, to amend the Employers' Liability Act of 1880. The Congress also hopes that these gentlemen will re-introduce the measure next session, and assures them of the continued support of the trades of the United Kingdom until the same be passed in law."

This was seconded by Mr. Jack (Glasgow), and supported by several other speakers, including Mr. Thomas Burt, M.P. It was carried unanimously.

The Enginemen's Certificates Bill.

Mr. Swift (Manchester) moved,—

"That in the opinion of this Congress much of the loss of life and injury to workpeople from boiler explosions and accidents to steam engines arises from preventible causes; that many of these causes may be removed or obviated by judicious legislation having for its object the institution of a system of certificated engineers for land engines and boilers as for engines at sea, so that only competent persons may be employed in positions of such responsibility; therefore the Parliamentary Committee is instructed to take immediate action for securing this much-needed industrial reform."

This was seconded by Mr. W. H. Lambton, of Hetton Colliery, who argued that if it was necessary that men who had charge of marine engines should have certificates of competency, it was no less necessary that parties who had charge of steam-engines and boilers on land should have like certificates, seeing that they had so large a travelling public whose lives were dependent on the good or bad management of locomotives, and that so many engines and boilers had been erected in the towns and cities, in the midst of densely-populated places, and in works where large crowds of "hands" were employed. The resolution was supported by three other speakers, and unanimously agreed to.

Factory and Workshops Inspection.

Mr. David Holmes (Burnley) moved, in the absence of Mr. Birtwistle through indisposition,—

"That it be an instruction to the Parliamentary Committee to continue to urge upon the Government the necessity for the appointment of an additional number of practical men, and, where expedient, women, as Factory and Workshop Inspectors, pointing out the utter impossibility for the present staff to maintain a due observance of the Act."

He said he did not want to detract from the efficiency of the present staff of inspectors, but at the same time he was of opinion that if practical workmen were appointed, the administration of the Act would be more efficient than at present. With regard to the number of inspectors, he might say that since the consolidation of the Factory and Workshops Acts they could not get the number of workshops,—that it was impossible to get a report, the inspectors having no report to give. That was because there was such a vast number of non-registered workshops. Those of them who were acquainted with the internal working of the factories of Lancashire and Yorkshire knew the necessity of pressing upon Government for an increased staff, while at the same time they should be induced to pay more attention to the fencing of machinery in order to avoid the chapter of accidents inserted in the annual reports of her Majesty's inspectors.

Mr. McLean (Edinburgh), in seconding the motion, said that when the Factory and Workshops Acts were consolidated in 1878, they were looked upon by a vast majority of those who had taken an interest in them to be a wise and beneficent settlement for many years,—setting at rest the question of factory and workshop inspection. So it would have been if the Government had taken any steps to enforce these Acts.

The resolution was unanimously carried, after a long discussion, at the close of which Mr. Neil M'Lean, Edinburgh, in answer to Miss Wilkinson, said he had it on the authority of the Chief Inspector that there was no power under the Factory Act to interfere with underground workshops or premises entirely lighted by gas. Then the amount of breathing space was not stated in the Act. The Chief Inspector himself, upon his own authority, had made it 250 cubic feet, being 100 feet per individual less than they were compelled by law to find for the worst criminals in their country.

Inspection of Mines.

On the third day of the Congress (Wednesday, September 10), after the presentation of the testimonial to Mr. Broadhurst (mentioned in our last), Mr. Reid (Durham), moved the following resolution, viz.:—

"This Congress has heard with much satisfaction the promise of the Home Secretary to increase the number of Inspectors of Mines, and therefore instructs the Parliamentary Committee to urge upon the Government the necessity of having these appointments made as speedily as possible, believing that the increased number of mines, in addition to their greater depth and extent of workings, imperatively calls for such increase."

This was seconded by Mr. Fenwick (Northumberland), who advocated an immediate increase in the number of inspectors of mines. At present, he pointed out, there were about twenty-four inspectors of mines, who had under their supervision something like 4,000 mines, or an average of 166 mines to each inspector. It was utterly impossible for an inspector to make a thorough inspection of a mine of any dimensions in less time than a week. The resolution was unanimonsly agreed to.

Co-operation.

On the motion of Mr. John Burnett (London), seconded by Mr. Knight (Newcastle), it was resolved,

"That the Congress, in giving a hearty welcome to the Delegates from the United Board of the Co-operative Union, desires to express its earnest good wishes for the success of all well-conducted attempts to promote and maintain establishments for co-operative production, in which the workpeople shall have a share in the product of their labours, and also for the general progress of the co-operative movement."

Trade Federation.

On the fourth day (Thursday, September 11), Mr. A. W. Bailey (Preston), moved,

"That this Congress cordially reaffirms the declaration repeatedly made by former Congresses, namely, that the establishment of a Federation of the Trades Organisations of the United Kingdom would be a source of strength to trade unionists, would promote good fellowship, and would prevent the occurrence of many avoidable trade disputes. But, seeing the want of success which has attended previous efforts on the part of the Parliamentary Committee to introduce a code of rules for a National Federation, this Congress is of opinion that it would be unwise to attempt to promulgate another scheme which would possibly prove abortive. It is, therefore, hereby resolved that it be an instruction to the Parliamentary Committee to assist and put into communication with each other trade societies and trade councils desirous of forming a federation, and to convene a meeting of representatives of such societies and councils whenever and wherever a sufficient number may desire to meet to prepare for themselves an acceptable basis for the formation of a permanent National Federation of Trades Organisations."

This was seconded by Mr. F. Willis (London), and carried by an overwhelming majority.

Goods Qualities.

On Friday, the 12th inst. (being the fifth day of the Congress), Mr. Uttley (Sheffield) moved, Mr. Church (Birmingham) seconded, and it was resolved,—

"That the attention of the Congress be called to the ever-increasing necessity of maintaining the excellence of our manufactures in the face of constantly-increasing competition abroad; and seeing that the tendency on the part of many manufacturers is to sacrifice quality to cheapness,—which, while it may tend for the time being to enrich unscrupulous manufacturers and speculators, in the end will entirely destroy confidence in our British manufactures, and eventually bring ruin upon the workmen,—would earnestly commend the attention of the Parliamentary Committee to the question of obtaining some direct and easy method of protection against the present system of falsely marking spurious goods, thus imposing upon the inexperienced purchaser."

Employment of Young Girls as Ironworkers.

Mr. Juggins (Darlaston) moved,—

"That it be an instruction to the Parliamentary Committee to use their best exertions to re-introduce the Factory and Workshops Amendment Bill of 1883 that applies to the employment of female children under fourteen years of age at forging nails, chains, bolts, or any such articles that are made from iron or steel."

He asserted that it had not been an uncommon thing for years past in South Staffordshire and East Worcestershire for girls of seven, eight, and nine years of age to be engaged in the manufacturing of nails, chains, rivets, bolts, and so on, a calling which was a disgrace to their sex. This had been allowed to go on, and without extraordinary exertion on the part of the Parliamentary Committee or the bringing to bear on it the influence of the Congress, it must continue to go on unless it was stopped by legislation. In submitting the resolution, he did not wish to interfere in the slightest degree directly with female labour, although he had not the slightest doubt he should be charged with the intention of, as far as possible, preventing the introduction or carrying on of female labour. He considered that the trades best adapted to female labour were those that should be encouraged for females, and not those that were adapted only to males, such as those of blacksmiths and of working in shops. He had travelled through the district of which he spoke, and could tell of a state of matters that would shock the modesty of every man and woman in that Congress; for great immorality, depravity, and pauperism prevailed, and everything that was calculated to lower and disgrace the sex in whose interests he was speaking, and the raising of whom in the social scale he advocated.

The resolution was seconded by Mr. Joseph Arch, and carried by a large majority against an amendment which proposed to instruct the Parliamentary Committee to obtain a Commission to inquire into the cause of complaints made in reference to the employment of females and young persons in the trades named in the proposition. Miss Wilkinson, in seconding this amendment, said she thought that in taking up this question they should remember that the boys wanted protection quite as much as the girls, and if there was a Commission of Inquiry that would be brought out. Mr. Juggins had said he had no intention of directly levelling this motion against female labour, but indirectly he had, because he would keep them from work under 14, knowing that would be as good as keeping them from work after 14. In the

* See p. 352, *ante*.

course of the discussion, Mr. Corbet (Nottingham) said he had seen girls carry away 3,000 bricks in a day, and the distance they had to go was about twenty-five miles, and the weight carried about twenty-five tons in all. Moreover, they would be wet through with sludge from the chin to the toes, and without a bit of shoe on their feet. He thought it was time that female labour was done away with where the workers were under 14 years of age.

Sanitary Inspectorships.

Mr. Petrie (Aberdeen) moved,—

"That in the opinion of this Congress it is desirable that only thoroughly practical men should hold the position of sanitary inspectors."

He observed that though the subject might not appear in the eyes of the delegates or of the public to be of much importance, viewed in its wider aspect it would be found to be of first-rate importance with regard to public health. The subject was touched upon the other day by several of the delegates in connexion with the Factory and Workshops Act, and it was pointed out by one of them that the evils to be found could be remedied by applying to the sanitary authorities in the district; but what he wished to bring before the Congress was, that the authorities responsible for the appointment of sanitary inspectors in the large towns should be held responsible for having such appointments made from the ranks of practical men who had wrought at and understood the subject. They never heard of such a person as a practical plumber receiving such an appointment, and this was not as it ought to be, for who knew better than a man who had engaged in, and was thoroughly conversant with the work, and could tell when it was done in a safe and satisfactory manner, or the reverse? From his own experience, he felt the present system to be a great injustice, and the trade which he had the honour to represent there felt it very strongly. That men who never learned, or who, perhaps, had never given any thought to the subject prior to their appointment, should be in a position to dictate to practical workmen who have such work to execute, was a highly unsatisfactory state of things.

The motion was seconded by Mr. Forbes (Aberdeen), and unanimously agreed to.

Recovery of Wages.

Mr. Smyth (London) moved:—

"That, in the opinion of this Congress, it is desirable that for the recovery of wages a workman shall have a first lien on the work accomplished by him, and that the Parliamentary Committee take action to so amend the law that a workman may recover his wages by some summary procedure."

Mr. Smyth is reported (in the *Aberdeen Free Press*) to have observed that in the building trade in England men were continually defrauded out of their week's earnings by "sloping" employers, who set up to do piecework and at the end of the week vanished, and the men got no money. This was a system which prevailed largely in London and other large towns, and the only way that a man could find redress was by spending about six times the amount of his wages. He considered that every man should have a claim upon the produce of his labour.

Mr. Abrey seconded, and the resolution was unanimously carried.

Free Libraries.

On Saturday last the Congress was brought to a close.

Mr. Foster (Hull) moved,—

"That this Congress, being of opinion that a general adoption of the Public Libraries Act would tend to greatly improve the social condition of the people, strongly recommend that the adoption of these Acts should be made compulsory in all towns, parishes, or districts where the Compulsory Education Acts are in force."

This was carried by twenty-seven to twenty-two, against an amendment which sought to make the adoption of the Act optional.

Sunday Opening of Museums and Art Galleries.

Mr. Freak (London) moved,—

"That it be an instruction to the Parliamentary Committee to use their best endeavours to secure the opening of the national museums and art galleries on Sundays."

Considerable difference of opinion was manifested on this question, and "the previous question" was moved, and carried by forty votes to twenty-one.

International Inventions Exhibition.—The latest date for sending in applications for space has been extended from the 1st October to the 1st November.

A MANUAL FOR MECHANICAL ENGINEERS.*

THIS work, which now appears in a third edition, can scarcely be considered as otherwise than a compilation of the investigations of eminent authorities upon mechanical science. The author is frank enough to give a detailed list of those he has "consulted or quoted," and consequently we may be forgiven if we say that there is nothing really new in this volume but the evidence of a vast amount of patient and careful research. Unfortunately, the author seems to have fallen into the same error which is characteristic of most modern scientific writers, viz., that of crowding into a book a multitude of tables and other data which have already been exhaustively treated as specialities. Surely, in a work such as Mr. Clark claims this to be, it is hardly necessary to introduce the well-worn "geometrical problems," especially as he aspires to produce a high-class text-book for mechanical engineers; nor is it satisfactory to find plane trigonometry finished off in a page and a half. Thus, the first thirty pages are devoted to an attempted elucidation of the elementary principles of mathematics, which, we are of opinion, might well have been omitted. Again, his subsequent chapter on "Mathematical Tables," he gives logarithms up to 1,000, but only in six places of decimals, so that in abstruse calculations, where an accurate result is essential, these tables will be almost valueless. The book illustrates, too, a bad habit on the part of scientific writers of swelling their volumes with reproduced matter, which can be obtained in a more convenient form elsewhere: thus we have in this book over 120 pages of such matter, all of which is contained in "Molesworth" or other equally well-known hand-books.

Under the head of "Weights and Measures," the author produces some valuable information, which is arranged in a very useful form. Commencing with water and air as standards, which are very clearly dealt with, he proceeds to treat the question of "Imperial Weights and Measures of Great Britain" in a most exhaustive manner, dealing with the various "wire-gauges," and our national standards of measurements and weights, with their decimal equivalents. That this chapter will be found extremely useful there can be no doubt, its value being enhanced by the comprehensive arrangement of the weights and measures of various nations. Not only mechanical engineers, but members of other branches of the profession require to use very frequently the standards of weights, measures, &c., of foreign countries; and we can, so far, confidently recommend this work, which clearly places before one the relative value of the standards of all parts of the world, as compared with our own country; indeed, we know of no other work which contains such concise and useful information upon the subject. Again, the following chapter on "Money" will be found to be extremely useful to those professional men who have business transactions abroad, enabling them, as it does, to reduce the value of work into the currency of the particular country in which they may be engaged. Of course, this chapter can only be considered as typical, as the rate of exchange, especially on the Continent, is constantly changed; but, notwithstanding, the information herein contained will be found to be invaluable. The following chapters and tables, on the weight and specific gravity of various materials, present nothing new really, but the tables are arranged usefully. In his treatment of "the weight of iron and other metals," the author has adopted the system of giving the equivalents of length to weigh 1 cwt. This will be found extremely useful for Continental and foreign work, in which the question of shipment and freights enter largely into one's calculations. With some elaboration, the author deals with the "fundamental mechanical principles," and especially that of the "inclined plane," which is very clearly demonstrated.

Under the heads of "Heat" and "Steam" are collected some very useful and interesting information, accompanied by copious tables; equally with a short chapter on the "Mixture of Gases and Vapours," with a clear description of the hygrometer. A brief consideration of combustion in its various phases introduces a very elaborate treatment of the question of "Fuel," dealing with British, American, French, Indian, and other coal in a most comprehensive manner; as also wood, wood-charcoal, peat, peat-charcoal, liquid fuels, and coal-gas. It is by the arrangement of such information that a work of this character will be found chiefly valuable, and we are pleased to be able to bear testimony to the satisfactory accomplishment of the evident object of the author. Again, under the head of "Application of Heat," will be found information of the highest value and assistance to those who are interested in warming and ventilation, treated, as the subject is, with an evident desire to be as complete and authoritative as possible.

The question of "the strength of materials" has evidently taxed the author's faculties to the uttermost, as, with few exceptions, he is obliged to traverse familiar ground. At the same time, we must commend the very clear way in which he elucidates some well-known theories, aiming at clearing up rather than creating difficulties, and we are especially impressed with those pages devoted to "the shearing stress of beams" and the "deflection of beams." The "strength of timber," illustrated by the results of experiments of M. Morin, MM. Chevaudier and Wertheim, Laslett, and others, will prove very valuable, backed up as they are by a carefully-arranged table of results. Cast iron, under varying circumstances, is dealt with by an elaborate analysis of the investigations of some of the most eminent authorities; whilst wrought iron is considered in a most exhaustive manner, giving the results of German, American, and other experience. Upon the subject of steel, the author has much to say, dealing almost historically with its manufacture, but there is nothing novel in his treatment of the question. We must confess that we are disappointed that so important a question has not received the attention it deserves, taking, as it does, so prominent a position in construction. "The strength of elementary constructions" is treated in a series of short chapters, of which the first on "Rivet Joints" will be found to be both interesting and useful; as, not only does the author deal with the question in a practical way, but he has arranged a series of experiments based upon the highest authorities. The succeeding chapter on "Pillars and Columns" is equally valuable, by the comparative results placed before the student. There is, of course, nothing new on cast-iron beams, though the volume would be incomplete without reference to what is now an almost obsolete form of construction. In the chapter on "Wrought-iron Flanged Beams or Joists" an excellent opportunity of dealing with this now universal system of construction has been lost, and the efficacy of the work is marred. A short chapter on "Railway Rails" forms a compilation of reliable information, which in this case cannot be found in a collective form elsewhere. The strength of ropes, chains, beltings, &c., is treated in some detail, and renders the work all the more complete; whilst upon the question of "bolts and nuts" the author appears to have consulted the highest authorities with a very satisfactory result. Some useful data is given in reference to hollow cylinders, but really nothing new; and this section of "Strength of Elementary Constructions" is concluded by a very well-considered and useful chapter upon "Framed Work." Although devoid of novelty, there is much in this chapter of a commendable character; for a somewhat difficult subject is clearly set forth, in a way likely to prove of great assistance to the student.

Under the head of "Mill Gearing" the author deals in a very comprehensive manner with the various mechanical appliances, especially toothed gear. This section has been most ably considered, more particularly with regard to the horse-power transmitted by toothed wheels. A very brief notice of "Frictional Wheel-gearing" is considered sufficient, but a half-page can hardly be deemed adequate for so important a question, whilst the following twenty-four pages deal with belt-pulleys and belts, and shafting, in a clear and complete manner. The "Evaporative Performance of Steam Boilers" in this and other countries is dealt with in great detail, and forms one of the most interesting features of the book, indicating a vast amount of very careful research. This is followed by an elaborate chapter on the steam-engine, with copious tables of results of experiments and actual practice, notably Table No. 297, of the "Net Cylinder Capacity, with relation to Steam admitted, and total actual

* "A Manual of Rules, Tables, and Data for Mechanical Engineers." By Daniel Kinnear Clark, Mem. Inst. Civil Engineers. Third edition. Blackie & Son, Old Bailey.

Work done." Under the head of "The Practice of expansive Working of Steam" the author is enabled to give some very interesting results of the experience with some of the principal condensing engines extant, in America and France as well as in this country. Two able chapters, one on the "Flow of Air and other Gases," and the other on the "Work of Dry Air and other Gas, compressed and expanded," deal with this important question in a very comprehensive manner, illustrated as they are by records of the experiments of the highest authorities at home and abroad. We regret that the author did not see his way clear to treat the important subject of "compressed air machinery" in more detail, an opportunity being thus lost to enhance the value of the work; indeed, he treats the whole question of "air machinery" in a very cursory manner. The chapter on "Flow of Water" would have been better omitted, and the same may be said of that on "Water-wheels"; the author elects to pass over so important a question as the effective power of turbines, contenting himself with simply reproducing well-known data. It is upon subjects like these the value of such a work is tested; and when, under the head of "Machines for raising Water," no notice is taken of the "Pulsometer" and other modern appliances, we feel it to be our duty to protest that the volume under notice can hardly claim to rank amongst the standard works upon mechanical science. A useful chapter on "Frictional Resistances" brings this work of nearly a thousand pages to a conclusion, and the impression left upon our mind, after a very careful perusal, is that for some things it will be found of unquestionable use, but the information might easily have been contained in a book of much less size, and we are all the more convinced that the tendency of authors to crowd a well-intentioned work with useless and inadequate elementary tables is to be strongly reprehended.

CONCRETE-BUILDING IN NEW ZEALAND.

BAKER'S CONCRETE MACHINE.

JUDGING from a recent number of the *New Zealand Industrial Gazette*, concrete-building is growing in favour in the colony, and among Auckland industries one of the most important appears to be the production of hydraulic lime by Messrs. Wilson & Co., who, according to the periodical in question, have been forced, by the prejudices of the local builders, to enter into the business of building, "in order to provide an outlet for their own produce, and to practically demonstrate that concrete made of their lime is a reliable and cheap substitute for bricks or stone, the relative costs of brick and concrete per cubic yard being:—brick, 33s. to 40s.; concrete, 22s. to 25s. In fact, the difference between a concrete and a really good wooden house is estimated at 10 per cent. only." An interesting account of the manufacture is given by the *Gazette*, from which we gather that Messrs. Wilson & Co. are determined to pit their hydraulic lime against Portland cement, which has to be imported.

An indication of the extent to which concrete is coming into use in the colony is afforded by the production of "Baker's Combined Gauging, Mixing, and Compressing Concrete Machine," which is the invention of the patentee, Mr. Robert Baker, manager of the Union Sash and Door Factory, Auckland. Mr. Baker, we are told, has had much experience in connexion with concrete work in America and other countries, and the invention is the result of numerous experiments suggested by this experience. Mr. Baker's machine is thus described:—

"About 10 ft. from the machine's foundation is a platform which slopes to the 'gauger,' so that the materials fall into the gauge boxes by their own weight. The gauger consists of a series of compartments, the number and sizes of which may be regulated to requirements by means at once simple and effective. These compartments have movable bottoms, that is to say, they are bottomed by a peculiarly constructed iron wheel, working horizontally, of course, the movements of which are regulated by an ingenious clutch on a vertical shaft. The compartments being supplied, the revolution of the horizontal wheel admits the required quantities of each of the ingredients into the receiver. To the vertical shaft just mentioned are fixed arms, which most effectually mix the contents of the receiver, while the water is added in an even and easily regulated shower by means of a perforated iron tank, fixed to the underside of the horizontal wheel already spoken of. The mixture is constantly passing from this receiver or mixing-pan into two chambers immediately below, one on the right and the other on the left side of the machine. These chambers are very cleverly fitted with the object of submitting the material to a very different process of mixing to that of the horizontal revolutionary motion which it undergoes in the pan above. The chambers in their turn deliver the perfectly mixed concrete into a mould beneath. . . . . The mould is fixed on a set of trolly wheels, running on rails spiked on to the top of the travelling bed, which is steadily moving backwards and forwards beneath the chambers and compressors. When the mould is nearly full, two compressing rollers speedily bring the concrete to a perfectly even and level surface. The trolly containing the block is then run off the travelling bed to a convenient place to set and harden, another trolly with empty mould taking its place. From the tipping of the materials from the dray to their reappearance as concrete blocks, no hand labour whatever is employed: it is a self-feeder and a self-deliverer. The quantity that can be put through in a day is estimated at from 1,000 to 2,000 cubic feet, in blocks up to 80 cubic feet, or from five to six tons weight. It will also turn out landings and pavings up to 42 ft. superficial, and from 3 in. to 12 in. thick. The machine is capable of being set to forty different combinations or arrangements of proportions. The weight of the machine is between four and five tons, and the power necessary to drive it is from eight to ten horse."

NEW TOWN HALL, LEAMINGTON.

THE new town-hall at Leamington was opened on Thursday last, the 18th inst. Hitherto the corporate and magisterial business has been transacted at the incommodious and inconveniently-situated edifice in High-street, erected in 1831 at a cost of 2,000*l*. With the incorporation of the borough in 1875, the need of better accommodation made itself urgently felt, and the corporation invited architects to send in designs for a new town-hall, a local practitioner, Mr. John Cundall, A.R.I.B.A., being the successful competitor. Tenders having been invited for the erection of the building, that of Mr. John Fell, of Leamington, amounting to 14,000*l*., was accepted.

The exterior is designed in the Renaissance style, and the materials used are finely-pressed red bricks with stone dressings from the Camden quarries. The Parade façade is 150 ft. in length, and is approached by a terrace formed of Stuart's granolithic pavement. The principal entrance is by a portico supported by twelve massive square stone columns, and six pilasters, with elaborately-carved capitals, surmounted by a stone entablature and balustrade. The lintels from the different pillars are of Portland stone. The portico has a vaulted covering of Camden stone, on which is formed a balcony of granolithic. For the erection of the portico a separate contract was made with Mr. Fell, the cost being 2,000*l*. The central block is entirely of stone, with carvings, mouldings, fluted columns, cornices, and other embellishments. The central pediment,—which is surmounted by the heron, an indigenous bird,—is especially noticeable (according to the *Leamington News*), the sculpture being relieved by a mosaic representing Hygeia, who is holding in her right hand a goblet and in the other a serpent, while a couple of cherubs are supposed to be offering libations of Leamington water at the foot of her throne. The pediment in the northern wing, which contains the Court-house, has a sculptured tympanum, illustrating Music, Science, and Art. Similar subjects are portrayed in the spandrels over the west window of the Court-house. The pediment in the south wing, over the oriel window of the Council-chamber, contains sculptured subjects illustrative of Wisdom, Justice, and Authority. The elevations are lofty and imposing, those of the wings being 60 ft., while that of the central feature is 70 ft. The main entrance in the Parade is provided with iron gates, manufactured by Hart & Son, of Birmingham and London. Leaving the stone vestibule, with its granolithic floor, enriched with panels of ceramic tesseræ, and its groined roof, the visitor passes through a pair of large folding mahogany and pitch-pine swing doors, with English oak framing, the lead lights above having been filled up with coloured glass by Mr. Holland, St. John's, Warwick.

The corridor on the ground floor,—which is several feet above the street level, and extends the whole length of the building,—is 10 ft. wide, 14 ft. in height, and floored with Stuart's granolithic paving. From this corridor access is obtained to the various offices of the Corporation officials. On the right side of the corridor, immediately opposite to the Town Clerk's quarters, is the Surveyor's office, which is lighted from the Holly-walk, and fitted with one of Barnard & Barnard's slow-combustion stoves, with Minton tile sides.

The approach to the first floor is by the grand central staircase, facing the main entrance, and consisting of a flight of twenty-eight steps, those in the first flight being 12 ft. in width, and, like the floors of the lower and upper corridors, composed of Stuart's granolithic. The staircase has a stone balustrading and handrail all the way on each side. At its base rise two massive square stone columns, supporting the landing above the corbels, consisting of sculptured figures.

The Council-chamber on the first floor is situated at the south end of the upper corridor, which extends to the Court-house at the north end. Opposite to the main entrance to the chamber the first object which arrests attention is the richly-carved and moulded chimney-piece of Portland stone. This is the work of Mr. Boulton, of Cheltenham, who also executed all the stone-carving throughout the buildings. The walls are panelled with mahogany and pitch-pine, to a height of 12 ft. At the east end is a gallery for the accommodation of the public. The apartment is lighted by five windows on the south side, and an oriel window, flanked by two side-lights in the Parade front. Stained glass is largely inserted in the windows, the best specimen being the six-light window presented by the Mayor, Mr. S. Flavel, jun. Five of these lights contain designs taken from Shakspeare's "As You Like It," and depict scenes in the Forest of Arden. The design of the remaining light is "Shakspeare reading his Plays to Queen Elizabeth." This window was executed by Mr. Holt, of Warwick. The wood-carving is the work of Mr. James Flower, Dale-street.

The Court-house, 80 ft. by 40 ft., has an elliptic ceiling, which is relieved with panels and enrichments, with centre flowers, two of which, with Boyle's ventilators fixed through the roofs, answer a useful purpose. From the sixteen pairs of double pilasters on either side of the room rise enriched curved ribs, which extend across the ceiling 30 ft. high, from which at intersections of the main ribs depend gaseliers on each side.

The Tower, at the east angle of the southern frontage, is 130 ft. in height, and contains a granolithic staircase, which was intended by the architect to lead to the School of Art, had that portion of the original design been carried out. It now forms an approach for the public to the Council-chamber, and also to the upper portion of the building. The clock has four illuminated dials, and strikes the hours upon a bell weighing about 15 cwt., cast by Messrs. Taylor & Co., Loughborough.

The contractor, as before stated, was Mr. John Fell; Mr. C. Franklin was foreman of plasterers; Mr. William Robbins was foreman of bricklayers; Messrs. Robert Lines and H. Smith were foremen of carpenters; and Mr. Henry Smith was foreman of masons.

The furniture was made from Mr. Cundall's designs by Messrs. Plucknett & Stevens. All the stained and coloured glass windows were supplied by Mr. Holt, of Warwick. The heating apparatus was manufactured by Mr. Jenkins, Leamington. The brass gas-fittings are by Messrs. Barwell, of Hampton-street, Birmingham. Mr. E. W. Atkins was the clerk of works.

THE DOME OF ST. PAUL'S.

SIR,—I agree with your correspondent, Mr. W. Cave Thomas, that the experiments in decoration now on view in St. Paul's prove that Thornhill's idea is the best yet put forward; and that to translate it into colour would be desirable.

It is capable of improvement, however, and that with little difficulty, its principal defect being in the *painted* architecture. Granting that the vertical divisions are right, the rapid diminution of the architectural features of which these are composed (sham pilasters or columns), is most unpleasant, and the arches they seem to sustain are ridiculous in proportion to their supports, and appear necessarily distorted, from being on a curved surface, as real arches could not be. Here the painter's skill could mend the evil by obscuring the arches and pilasters. The figures of angels with spread wings would do this service for the former, and bold decoration on the latter would suffice for them. Then the grand simple spaces left are just what would give scope for the painter's art on a proper and sufficient scale, and such as Wren contemplated. This would be far better than the *petite* and confused treatments of circular panels suggested to be substituted for them.

JOHN P. SEDDON.

NEW ADMIRALTY AND WAR OFFICES.

SIR,—While thanking you for the accurate and excellent plans and view of the design for the above building given in the *Builder* of this date, allow me to point out that you have inadvertently reversed the order of the authors' names, that of Mr. Aston Webb having hitherto invariably, and properly, held the first place. E. INGRESS BELL.

Sept. 13th, 1884.

SKETCHING AT THE HEALTH EXHIBITION.

SIR,—Whilst examining the plans, placed on the walls for public inspection and instruction, of the "sanitary" and "insanitary" houses, their sewerage and drainage, it struck me an improvement would be effected by a slight alteration in the ventilating pipe or shaft; and I began to copy on a small piece of paper this portion of the work, with the view of showing therein the proposed alteration, but had scarcely commenced when a police constable on duty immediately stopped me, as acting under orders to that effect. I dare not venture to question the policy of such proceeding; but permit me, through you, to ask the Commissioners and other authorities having the management of this Exhibition of Health instruction, whether they have, in fact, issued any such prohibiting order; and if so, whether, to prevent any unnecessary irritation on the public by coming in contact with the police, they have caused printed notices to be affixed at the several entrances of the building and other suitable places for the guidance of the public?

A VISITOR.

PARTY WALLS.

SIR,—I should be greatly obliged if any of your numerous readers could inform me where I could obtain a good book relating to the laws and rights of party-walls?

I am about to build a house attached to another I sold a short time since, reserving to myself the use of the end wall as a party-wall to rest beams in, &c., or other supports as are generally required. But in building this new house adjoining I want to build *on* the party-wall, as I have to build an additional back bedroom.

The question is, Can I raise on this party-wall, without the consent of my co-partner? Of course, there would be no lights or obstruction in the said wall intended to be raised, and I should have to protect my co-partner from any injury to his house, and hold him free of any cost in the matter.

An early answer will oblige, SUBSCRIBER.

A COST CLERK'S DIFFICULTY.

SIR,—Will you kindly allow one of your correspondents to instruct me upon the following:—

I am engaged as a cost clerk. Having booked up the time on the various jobs, I next proceed to book up the stores and miscellaneous charges: such charges are not booked direct on each job, but are spread proportionately over each; the miscellaneous charges consist of foreman's, labourers', &c., wages.

Now, the doing so seems to me to be incorrect. Say, for instance, that the wages are for one week, 20*l.* or 30*l.*, and the stores and miscellaneous charges amount to 6*l.* or 8*l.* Posting up such charges proportionately on the bulk of jobs seems to be utterly wrong. Jobs of the value of 5*l.* will have, perhaps, 1*l.* or 2*l.* for such charges, whilst others of 10*l.* will have, say, 5s., such items depending upon the weekly charges distributed over the various amounts for labour.

Will you kindly say if my method is correct, and if not, point a more suitable way of keeping such costs? The nature of the material does not enable me to book the exact quantities used on each job.

A CLERK.

*** Our correspondent seems to have failed to express his precise meaning. If the charges are, as he says, distributed "proportionately," how can the disproportion suggested arise?

RESPONSIBILITY FOR ACCIDENTS TO WORKMEN.

SIR,—In answer to the inquiry of "A Surveyor" [p. 374, *ante*], if a sub-contractor undertakes the labour of constructing the scaffolding, he alone is responsible for the manner in which it is constructed. X.

"A PERIODICAL QUESTION."*

SIR,—Cockroaches may easily be got rid of by mixing one teaspoonful of dry red lead with three teaspoonfuls of good dry flour. When well mixed, place some on the bottoms of inverted plates, throw some loosely into corners and holes where they are seen to come from. Mix again fresh in, say, forty-eight hours, and soon you will be quite free. The flour must not be in the least sour.

WM. HOSKEN.

See p. 340, *ante*.

PROVINCIAL NEWS.

Wigan.—It will be remembered that a new infirmary was erected in Wigan about ten years ago, and opened by H.R.H. the Prince of Wales. This building (known as the Royal Albert Edward Infirmary) provided accommodation for about 100 beds, and the success of the undertaking has been very complete and satisfactory to those who supported and inaugurated it. So much is this the case, that it has been found necessary to enlarge the building, and a detached wing is now in course of erection, containing accommodation for twelve special wards for severe cases, children's wards, and a separate nurses' home of twelve rooms, with the necessary kitchens, lavatories, bath-rooms, &c. These will be connected to the main block by a glazed corridor, which it is proposed to make into a winter garden and exercising-place for the convalescent patients. Mr. Thos. Worthington, of Manchester, was the architect of the original building, and Messrs. Worthington & Elgood are now carrying out the additions in a similar manner. Mr. J. Preston, of Wigan, is the builder employed, and his contract for the portion of the works already decided upon amounts to abont 3,600*l.*, exclusive of the internal fittings and other works.

Derby.—A Fine Art Exhibition is to be opened at Derby, by the Mayor, on November 3rd. The exhibition is inaugurated for the encouragement of amateur art work, snch as painting on china, terra-cotta, silk, tapestry, Lincrusta-Walton, designs for Christmas cards, wood-carving, etching, &c. The awards to successful competitors will comprise thirty-six silver and bronze medals, a silver badge, twenty guineas in money prizes, statuettes, vases, &c., and one hundred diplomas of merit. The exhibition is being organised by Mr. W. W. Winter, of the Alexandra Fine Art Galleries, Derby.

Weymouth.—The new banking premises for Stuckey's Banking Company, on the Parade, at its junction with Bond-street, have now been completed. The style adopted by the architects is French Renaissance of the Burgundian type, the elevations being of red brick and Portland stone, while the roof is covered with green slates. Internally, the only apartment admitting of special treatment to harmonise with the exterior is the banking-room. The entrance to it (from Bond-street) is through a handsome semicircular-headed doorway, the principal feature in the whole of the stonework. Pitch pine is the material used for all the woodwork in the banking-room, except the counter and desk tops, which are of mahogany. Connected with the public room is the bank parlour, which also communicates with the manager's residence. Upstairs the oriel windows, facing Bond-street and carried upon stone corbels, give large additions to the drawing-room and three bedrooms, besides a sea view to each. The architects are Messrs. Paull & Bonella, of Chancery-lane, London; the builder being Mr. Albert Clarke, of Weymouth.

CHURCH BUILDING NEWS.

Drayton Beauchamp.—The east end of Drayton Beauchamp Church has just been enriched by the addition of a new oak reredos, designed by Messrs. Carpenter & Ingelow, as a memorial to the late rector. The design is of the Perpendicular period, to assimilate with the architecture of the church. In addition to much richly-carved detail, it contains a sculptured representation of the "Sermon on the Mount," also in oak. Mr. Forsyth, of Finchley-road, Hampstead, was the sculptor.

Newark.—A costly reredos has lately been erected in North Clifton Church, Newark, to the memory of the late Mr. George Freeth, of North Clifton Hall. The designs were made by Mr. John T. Lee, architect, of 26, Great James-street, Bedford-row, London; and are intended to illustrate the doctrine of the Incarnation. The reredos contains panels, in which are figure-subjects, painted in gold and colours. The centre panel, over the altar, represents the Epiphany, with the shepherds and wise men adoring the infant Saviour. The centre group is flanked by two panels, representing the Annunciation, one containing the figure of the angel Gabriel, the other the blessed Virgin Mary receiving the message. The side panels are surrounded by foliage of the vine, wheat, olive &c., and represent the busts of the four evangelists who wrote the history of our Lord. Above them are standing figures of the four great prophets, viz., Isaiah, Jeremiah, Ezekiel, and Daniel. Above the east window the vine ornament is again introduced on a larger scale, to form the ground-work for three medallions with angels. The framework of the reredos is executed in oak, by Mr. Earp, of Lambeth, from the designs of the architect, and is decorated in the style of the best examples of the old Norfolk screens. The decoration of the walls and the reredos are by Messrs. Heaton, Butler, & Bayne, of Garrick-street, London.

Bristol.—On Monday last the Bishop of Gloucester and Bristol laid the foundation-stone of St. Lawrence Church, Lawrence-hill, Bristol. The parish has, in accordance with the scheme of the Bristol Church Extension Commission, been formed, principally from the large and overgrown parish of Holy Trinity, and partly from St. Matthew's, Moorfields. The district contains a population of 4,500, almost entirely of the labouring classes. The style of architecture adopted for the building is Early English. The site, which is hemmed in by neighbouring properties, presented many difficulties to the architect, especially in the matter of lighting. The church will consist of narthex, nave, north and south aisles, tower and spire, western gallery, chancel, chapel on south side, organ chamber, and vestry. The total internal length will be 115 ft., width across the nave and aisles, 56 ft.; and height from the floor level to the apex of the nave roof (which will be open-timbered), 58 ft. For the general walling, Pennant stone will be employed, with dressings of Bath stone. The walls on the inside will be stuccoed. Arches of Bath stone and brick will divide the aisles from the nave; the columns which are to support them will be of rubbed and sanded Pennant stone. The windows are to be filled with rolled cathedral glass in geometrical patterns, supplied by Mr. Ben Gay. Sitting accommodation will be provided for about 700 worshippers, the seats and gallery being of red deal, varnished. The gangways and narthex are to be paved with Staffordshire tiles, and the chancel with encaustic tiles. Artificial heat is to be imparted to the interior by one of Grundy's heating apparatus. The west elevation, with its tower and spire rising to a height of 115 ft., will present an important frontage to the main road. The accepted estimate for the first portion of the church is 3,200*l.*, and a provisional contract has been entered into for the completed work, inclusive of upper portion of tower and spire, for 590*l.*, making a total of 3,790*l.* The work has been entrusted to Messrs. Wilkins & Sons, of Surrey-street; Mr. Honey acting as clerk of the works. The architect is Mr. John Bevan, of Unity-street, Bristol.

SCHOOL-BUILDING NEWS.

Peel (*Isle of Man*).—On his recent visit to the Isle of Man, his Grace the Archbishop of York laid the foundation stone of the Isle of Man Navigation, Grammar, and Mathematical School, which is being erected on a site close to the new church at Peel, of which we gave some particulars on p. 374, *ante*. Messrs. T. D. Barry & Sons, of Liverpool, are the architects of the building.

Goudhurst.—A large and substantial block of buildings has just been completed here for the Rev. J. J. Kendor, for a ladies' college. The buildings are in the form of the letter H, the centre being the residence, on the right the school, and on the left the dining-room, bedrooms, lavatories, and other necessary conveniences. The walls throughout are built hollow, on account of the elevated and exposed position of the building. The sanitary arrangements and water-supply have, we are told, been well cared for. Accommodation is provided for about fifty boarders, besides teachers, family, and domestic offices. This is the second large establishment erected in the locality, besides additions to a third (the two latter being boarding-schools for boys), the builder in each case being Mr. A. Martin, of Horsmonden, Kent, and the architect Mr. William Theobalds, of Watling-street, City.

Architectural Association.—As will be seen by an advertisement on our front page, Session 1884-85 of this Association will commence early in October.

The Student's Column.

HINTS FOR THE STUDY OF THE HISTORY OF ARCHITECTURE.—XII.

RENAISSANCE (CONTINUED), AND THE REVIVALS.

On page 162 of Professor Roger Smith's "Gothic and Renaissance," the author remarks that "design in Renaissance buildings may be said to be directed towards producing a telling result by the effect of the buildings taken as a whole, rather than by the intricacy or the beauty of individual parts; and herein lies one of the great contrasts between Renaissance and Gothic architecture."

In Italy, which was treated of in the last article, this distinction was aimed at from the very beginning by Brunelleschi, and still more by his contemporary, Alberti, whose Church of St. Andrea, at Mantua, and Rucellai Palace at Florence, fulfil the above-named definition as completely as possible.

In other countries this submission to rigid rules of composition was delayed, and, in the meantime we find a coy flirtation going on between the styles of the soil and the elegant stranger, which it is most interesting to watch. In the end they all gave way to the Classic influence, as the universally fashionable thing to do.

After Italy, Fergusson, in his "History of Modern Architecture," goes on to Spain, where the good points of Gothic work asserted themselves bravely before giving in. See the illustration on page 148 of the Court of the Archiepiscopal Palace at Alcala, built early in the sixteenth century, in which the entablature over the upper column is carried by very pleasing (though "incorrect") brackets. In other examples, such columns support flat cusped arches inherited from the native architecture. These flat arches survive in the Paranimfo, a State apartment, though here they are placed between more correctly Classical pilasters and entablatures. At the same time the ceiling of the apartment is panelled into a pattern of hexagon and six-pointed stars that is quite Moorish in style. The palace of Charles V., at Granada, 1527, though quite an "orderly" design, has more circular windows and medallions about it than one would find in Italy. When it came to building the Escurial, a huge palace, including a cruciform domed church, in 1563, the design, prepared by Gianbattista of Toledo, and executed by the celebrated architect Herrera, is quite Classic. So, of course, is the palace at Madrid, rebuilt after the fire of 1734, from the designs of Ivara, an Italian architect. The palace at Mafra, in Portugal, of about the same date, is as Classic, but with a skyline pleasingly broken by spires and lofty roofs over certain portions.

In the provinces, Fergusson hints at the existence of a more national style, but regrets that Renaissance art in Spain has not been illustrated. Street has since drawn and described her Gothic work; there is an opening for an equally good professional work on her Renaissance buildings.

Turning now to France, we find that Francis I., 1515-1546, was, to use Fergusson's expression, fairly bitten by the Italian mania of the day; and that, after visiting Italy, he brought back Leonardo da Vinci to France, and that he invited thither Benvenuto Cellini, Primaticcio, and Serlio, and occupied them all on his works at Fontainebleau and elsewhere. Soon there followed a group of palaces and châteaux, that have all the play of plan and outline belonging to Gothic buildings, combined with refined Renaissance details,—a very beautiful phase of architecture. The Louvre and Tuileries were treated in a comparatively formal manner, but the châteaux of Blois, Chambord, Amboise, Fontainebleau, Chenonceaux, Madrid, Gaillon, Vallery, Verneuil, Charleville, and Ecouen, are enumerated by Fergusson, page 164, as examples of the graceful architecture of the day. Churches were the exception among those buildings. That of St. Eustache at Paris is an example, dating from 1532, which is completely Gothic in all its arrangements, with Classic details, attenuated to do duty in novel positions, and thereby losing all their proper proportions. It is thus an adaptation of the two styles one to another, but not an amalgamation of them, and soon there came the inevitable "orders," very much as we find them in Italy, but mixed with all the vagaries affected by the Jesuits. From this there was a reaction which, under the eminent architect, Jules Hardouin Mansard (nephew of François Mansard), produced the dome of the "Invalides," in Paris (see page 172 of Fergusson), a building that may fairly be compared with our contemporary St. Paul's.

This Mansard also designed the extensive Palace of Versailles, of which Fergusson says, on page 211, that its dimensions are probably unsurpassed by those of any in ancient or modern times, the entire length being 1,320 ft.; but the design is very monotonous.

The completion of the Louvre at Paris seems to have passed through the hands of several architects. François Mansard was consulted, Bernini was sent for from Rome, Marot and Lemercier presented designs, and ultimately the design of Perrault was preferred before those of all the other competitors. Although Fergusson admits that no design of that day (1670) can at all compete with the eastern façade of the Louvre, he proceeds to heap critical abuse on it for a couple of pages. If, however, an external "telling result" is what we look for in Classical buildings, surely this façade fulfils the requirement most satisfactorily. Let any student run over to Paris and rush to this end of the Louvre early in the morning, before the sun goes off it, and he will not regret the trouble.

The French have gone through their fair share of slavery to Classic art, but, after all, they have now assimilated it very satisfactorily, and evolved a modern style of which they may be justly proud.

Besides their ecclesiastical and domestic architecture, the French have produced public trophies, triumphal arches, fountains, &c., that show their taste in these matters to be far ahead of that of other nations.

Altogether, a stroll in the streets of Paris on a fine day is a thing to be enjoyed, and renders the contrast with the streets of London a painful one; in fact, it always takes many days before we can reconcile ourselves to our dingy disorganised capital on returning to it, especially if we are intent upon getting at the beginning of the Renaissance in England.

For this purpose we must go to the Rolls Chapel, near Chancery-lane, and after getting due permission, and probably a lantern, see what we can of the monument of Dr. Young. This is said to be the earliest example of the imported style, and to have been executed by Torrigiano, the sculptor who broke Michelangelo's nose, which fact will assist one in remembering the date of the monument, 1516. It was followed by a more important one, namely, that which Henry VIII. erected to the memory of Henry VII. and his Queen, in his chapel at Westminster.

In time the style spread to structures of greater size; perhaps the earliest example of a building is at Layer Marney, 1525, and we have records of gateways at Whitehall, designed by Holbein, who was chiefly known as a painter,—another of those foreign artists whom our many-wived king encouraged. St. James's Palace is another instance of the dawning Renaissance, as may be seen in the carving of the spandrels over the four-centred arches of the main gateway. Another foreigner, this time from Cleves, namely, Theodore Have,—or Havenius, as the Classic fashion required him to be called,—designed the Gate of Honour at Caius College, Cambridge, in 1574 (see page 247 of Fergusson). Here, four-centred arches and "orders" are cleverly put together, but hardly united. This University and Oxford, being of course the headquarters of learning, contain many examples of the "learned" style. At the Schools, Oxford, we have the five orders piled one over another, according to the Vitruvian precept.

Yet another foreigner, John of Padua, is said to have designed, in 1567, Longleat, in Wiltshire, the present seat of the Marquis of Bath. There is certainly much Italian feeling in the treatment of the wall surfaces, though the plan of the house is essentially English; that is to say, the chief windows command the views of the surrounding country, and do not look into a courtyard, according to the Italian fashion.

This continued importation of foreign talent had led to a rising on May Day, in 1517, with the intention of cutting to pieces all the strangers in London, amounting, it was said, to 6,000 or 7,000, and so it is satisfactory to find that in the time of Queen Elizabeth the fashionable architect was John Thorpe, who designed many of the houses which have gained the name of "Elizabethan" for the style of her period. Many of these are to be found illustrated in Shaw's "Elizabethan Architecture," 1 vol., quarto; Richardson's "Old English Mansions," 4 parts, folio; Richardson's "Specimens and Observations on Elizabethan Architecture"; J. Nash's "Mansions of the Olden Time," 3 series, folio; Hakewill's "Elizabethan Architecture," 1 vol., octavo, in which the style is compared with Italian work, but the mullions and transomes are omitted from the English work. Last, but not least, John Thorpe's original drawings are to be seen at the Soane Museum in Lincoln's-Inn-fields, and are, in a sense, the most interesting of all.

The style goes on through the reign of James I., but by the time of Charles I. an English architect, Inigo Jones, had been to Italy to study the fashionable architecture at the fountain-head, and after erecting a few buildings in which he retained mullions and transomes, he threw off even these vestiges of Northern custom, and went boldly and entirely for Italian, treating it, however, with great originality and ingenuity. The banqueting-hall (now the Chapel Royal) at Whitehall, is a very small portion of an intended enormous palace that he designed. This elevation may not look anything out of the way on paper, but any one who passes slowly under it must become aware of the great amount of variety introduced into its seven bays. Except in the very centre, there are not two consecutive columns or pilasters alike, and the great projection of the pediments over the windows, gives great play to the perspective of the whole front, as seen from below.

After Jones,—to whose numerous works Fergusson specially devotes eight pages,—he goes on to pay a still larger tribute to Sir Christopher Wren, whose grand opportunity was afforded by the Fire of London in 1666, and who graced the City with a forest of steeples so varied and beautiful that we jealously begrudge the present removal of some of them because the resident population of the City has, for the moment, migrated into the suburbs. When the secret of smoke-consumption has been found, men of business may be glad to "live over their shops" again as in days of old, and then they will regret the want of church accommodation.

Wren's buildings are so numerous that we can only name one or two besides St. Paul's Cathedral. Every student should enter St. Stephen's, Walbrook, near the Mansion House, to see the elegant arrangement of a dome carried on eight Corinthian columns. The interior of St. James's, Piccadilly, is a good example of a church with galleries, which were the fashion in those days, and for which most of the churches were so specially designed that one stands aghast at the removal of them and the consequent utter destruction of proportion that has, since the Gothic Revival, been placidly effected here and there.

Of Wren's steeples (for which A. Taylor's Prize Essay at the Institute, since published by Batsford, is a handy companion), that of Bow Church is considered the best. Greenwich Hospital,—where he followed Inigo Jones,—Chelsea Hospital, and Hampton Court Palace, are examples of his secular work.

After Wren there were several architects who have formed a fine school of Anglo-Italian work, among them Hawksmoor, Vanbrugh, Kent, Gibbs, Sir William Chambers, the brothers Adam, Taylor, and Dance. The latter designed Newgate Prison, which is as expressive a piece of architecture as the world has ever seen.

The domestic architecture of this period, the eighteenth century, became painfully symmetrical, as may be seen from the illustrations of Keddlestone Hall and Holkham, on pp. 294-295 of Fergusson's "Modern Architecture," the plan of the former resembling one of those insects that rest on the water poised on four long legs, representing the corridors leading to four outlying symmetrical departments.

As has been said above, the beginning of the present century introduces us to yet another phase of imitative architecture. Hitherto the Classic styles have been adapted. Now they became adopted. Fergusson attributes this to the publication of illustrated works upon Roman, and more especially Grecian architecture. He says, "once the fashion was introduced it became a mania." He instances

the new Church of St. Pancras, in the Euston-road, designed by Inwood, as giving us a very exact reproduction of Grecian Ionic, and also of the caryatid portico of the Erechtheium at Athens, and, so far, we may be thankful for it. There are several other dead bones in our midst.

While men's minds were still in this state of resignation to anything so long as it was correctly ancient, the revival of Gothic architecture came as a welcome change. While equally inexorable in its demand for correctness, it had the advantage of re-introducing the style of our climate, and, whatever may be preached to the contrary by votaries of the mouldy picturesque, its attendant mania for "restoration" has done (on the whole) more good than harm.

"Correct" Gothic has lately been found either too expensive or else inappropriate for ordinary domestic buildings, and we are now gradually developing something quieter and more in harmony with our tastes and habits, and in which there shall be no sense of frantic *effort*,—either to copy a past style, or to suddenly invent a new one. "*Ars est celare artem.*"

THE SACRAMENTS-HAUSLEIN AT NUREMBERG.

SIR,—May I venture, with all due respect to the able writer in the Student's Column [p. 341, *ante*], to suggest that he is possibly mistaken in thinking the summit of the spire of the Sacrament-Hauslein at Nuremberg was bent beneath the vaulting because it was too high to stand upright? It is my humble opinion that it was originally designed so, to represent a crozier; and I am confirmed in that opinion by the fact that a somewhat similar sacred receptacle was erected by one Veit Stoss in St. Mary's, at Hersbruck, a small town of the ancient territory of Nuremberg, that has an unmistakable crozier as a final.

The minor pinnacles seem to be curled over from mere caprice.

I send the above that I and others of my acquaintance may be put right,—if we are wrong.

REUBEN G. NORMAN.

London, Sept. 11, 1884.

*** Mr. Norman and others of his acquaintance *may* mean a bishop's *pastoral staff*, which terminates in an ornamental crook, while an archbishop's *crozier* always terminates in a cross" (Hook's "Church Dictionary," p. 307); but if this spire-head be unbent, it will be found to continue the *sloping* lines of the rest, whereas a pastoral staff is straight until the crook begins.

In Lonsdale and Tarver's "Costume" will be found, on plate 9, an archbishop of the thirteenth century with his crozier, and on plate 36 a bishop of the fifteenth century, with his pastoral cross. The latter is taken from Boutell's "Brasses," in which also will be found the brass of Archbishop Cranley, A.D. 1417, with his crozier.

If the example illustrated in Fergusson's "Handbook," p. 759, be *earlier* than that at St. Mary's, Hersbruck, which the writer has not seen, the suggestion of a pastoral staff may have been carried out in the latter.

Probably the real fact is that the designer of the Sacraments-Hauslein turned the finial because he liked doing it.

BUILDING PATENT RECORD.*

APPLICATIONS FOR LETTERS PATENT.

Sept. 5.—12,019, W. Potts, Edinburgh, Apparatus for Ventilating Purposes.—12,020, W. Potts, Edinburgh, Burning Fuel for Heating Purposes.—12,037, C. F. Newman, London, Drain-pipe for effecting junctions with Brick and Pipe Sewers.—12,063, J. B. Colbran, London, Cooking Ranges.—12,066, H. Godwin and W. Hewett, London, Manufacture of Tiles.

Sept. 6.—12,067, E. V. Bailey, Birmingham, Spindling Knobs for Locks and Latches.—12,097, J. Maclaren, Cupar, Composite Paving Block.—12,098, W. Sargent, London, Flushing Water-closets, &c.

Sept. 9.—12,158, W. C. Haigh, Manchester, Fire-lighters.—12,181, W. Bahre, London, Preventing the Slamming of Doors.—12,188, R. Booth and R. W. Booth, Dublin, Flooring Clamp.—12,192, S. A. Hugh and P. G. Hugh, London, Water Waste-preventing Cistern without Ball-valve.—12,200, T. J. Constantine, London, Close Ranges and Stoves.—12,217, E. T. Lambert and E. J. White, London, Self-closing Valves for drawing off Water.

Sept. 10.—12,246, F. Wilkins, London, Asphalte Pavement.

Sept. 11.—12,272, J. H. Kenyon, Manchester, Flushing Water-closets, Drains, &c.—12,290, W. H. Hindle, Halifax, Water-closets.—12,291, J. E. Walsh, Halifax, Portable Hand-bolt for Doors and Windows. Com. by F. Lebacq, Brussels.—12,299, C. Wall, London, Jointing of Sanitary Pipes, &c.

* Compiled by Hart & Co., Patent Agents, 186, Fleet-street.

SPECIFICATIONS ACCEPTED.*

Sept. 9.—164, F. Lea, London, Lever Catch Fasteners for Windows.—4,176, W. R. Cornell, Grays, Concrete Building, &c.—8,345, W. H. Chapman, Lewisham, Ventilating.—11,021, A. Hübner, Cologne, Retaining Walls.

Sept. 12.—145, J. Bate, London, Fire-grates and Stoves.—6,370, J. Carter, London, Window Sashes.—10,381, S. Turner, Barrow Haven, Clapper for forming Ridges, Finials, &c.

* Open to public inspection for two months from the dates named.

Miscellanea.

New Vicarage House for St. Bride's, Fleet-street.—The parish of St. Bride, Fleet-street, has not hitherto had the advantage of a clergy-house within the parish, but this is about to be remedied by the erection of a new vicarage, which has already been commenced. The site fixed upon for the new building is a portion of the vacant land in Bridewell-place, situated between the police station and the London City Mission Buildings. The principal frontage of the new vicarage faces Bridewell-place. It is 44 ft. in length, and 48 ft. in height from the pavement line to the ridge of the roof. The style of architecture may be described as a mixture of the Elizabethan and Queen Anne. The building will be faced with red Fareham brick, the dressings, architraves, and cornices being in gauged brick, with a free introduction of carving and ornamentation. The building will contain a basement, together with ground-floor, first and second stories, and attics, having alternate arched and pediment windows. The basement contains the kitchens and other offices. The ground-floor, which will be approached at the entrance by a flight of steps, contains a spacious entrance-hall, dining-room, library, and offices. The first floor contains the drawing-room, a bed-room, and bath-room, while the second and attic floors contain together six bedrooms, with dressing-rooms in addition. Mr. Basill Champneys, of Buckingham-street, Strand, is the architect, and Mr. B. E. Nightingale, of the Albert Works, Lambeth, is the contractor. Mr. Goodchild is clerk of the works, and Mr. J. Snook the foreman.

The State of the Thames.—Mr. Edmund Kimber, of Walbrook, has addressed a letter to the Secretary of State for War, calling attention to the fact that the Royal Commission appointed to inquire into the condition of the Thames, and to report upon what remedies ought to be adopted to meet the grievance, has now been sitting for about a year and a half, and has not yet reported upon the remedies. "In the meantime," says Mr. Kimber, "cholera has been, and is now, raging in France and Italy, from whose ports ships daily enter the Thames, and the people on the banks of the Thames have been afflicted with diarrhœa and dysentery. Were it not for the otherwise cleanly habits of Englishmen there is no doubt these maladies would have turned long since to cholera, and would have decimated the working men and officials in the Royal Arsenal, Dockyard, and Barracks at Woolwich, with the greatest certainty. Even as it is, many of the working men have complained to me of the horrible and loathsome stench coming from the river as they are working in the Arsenal, bringing on, as it does, a certain weariness and sickness, which prevent them from doing their work properly. Now, this is manifestly a great loss to the nation, especially at this time, when the greatest care, skill, perseverance, and nicety are required on the part of the men in preparing for the Nile expedition." Mr. Kimber urges the Secretary for War "to cause the Royal Commissioners immediately to send in their report, or else to advise her Majesty to discharge them. They might," Mr. Kimber thinks, "very easily have reported long ago."

Metallic Cement for Repairs.—Messrs. Dreyfus & Co. call attention to the use made by them of Tabary's patent metallic cement in repairing the stonework of the pediments and columns of St. Peter's, Eaton-square, and also in one of the bays of the Houses of Parliament. They state that "the process of restoration consists of hacking off the decayed portions of stone and facing it with the cement, instead of removing the block of stone and replacing with new. It consists of a pure stone reduced to powder and reconstituted to its primitive state, producing a stone impervious to all atmospheric effect; it is carved in the same manner as ordinary stone."

Hot Blast, and Economy in the Blast-Furnace.—At a meeting of the South Staffordshire Institute of Iron and Steelworks Managers, held at Dudley on the 8th inst., Mr. A. E. Cowper, of Middlesbrough, read a paper on this subject. The wide adoption of the system in the North of England had led the Staffordshire furnace proprietors to inquire more closely into its suitability for South Staffordshire, where at present only a few establishments have adopted it, amongst others the Spring Vale Furnaces of Mr. Alfred Hickman, where the pigs are obtained for the New Staffordshire Steel and Ingot Company's Works. In the discussion which followed the reading of the paper, the general opinion was in favour of the stoves. The Chairman, Mr. Hudson (president of the Institute) said they had two furnaces,—one with the temperature at 900° and the other at 1,500°,—and they found the difference in favour of the hot-blast stove to be from 3½ cwt. to 4 cwt. of coke to 1 ton of iron. Moreover, the coal and slack, which amounted to 6d. or 9d. per ton of iron produced by the iron pipe stove, was entirely saved, since no coal or slack was needed in the hot-blast stove. The only repairs necessary during eight years of use had been one change of the gas valves and an occasional change of the hot-blast valves.—*Mining Journal.*

Harrogate.—The three windows of the south transept of St. Peter's Church, Harrogate, have just been filled with stained glass, presented by the Mayor, Mr. Nicholas Carter, and his brother Richard Carter. The transept has two tall three-light windows, surmounted by a rose in the gable. In the upper part of the north-eastern window, and in the central light, there is the figure of St. Gabriel, the angel of the Annunciation, while in the corresponding central position, in the other window, is that of the Blessed Virgin, thus portraying the subject of the Annunciation. In the light below there are figures of several Biblical characters and early Christian martyrs, with legends and scrolls, all having a bearing either on the Incarnation of our Lord, or suitable to the figure over which they are placed. The windows are given in memory of four sisters by their brothers. They have been successfully carried out by Messrs. Burlison & Grylls, under the direction of Messrs. G. F. Bodley, A.R.A., and T. Garner. By the same donors and designed by the same architects, a carved and painted reredos has also been added. In the centre of it is a painted panel, the subject being "The charge of St. Peter."

Cadzow (near Hamilton, Glasgow).—On the 7th inst. the new Roman Catholic Church at Cadzow, dedicated to Our Lady and St. Anne, was consecrated and formally opened for divine service. The church is situated on the Eddlewood Estate, about midway between Quarter and Cadzow. The buildings stand on an elevated site, one acre in extent, facing the Quarter-road. They are in the Early English Gothic style, with a frontage of 90 ft. and a depth of 80 ft. The church and a commodious presbytery form one group of buildings. The chapel is entered by a side porch with arched doorway, and internally measures 70 ft. by 26 ft., with side transept 20 ft. by 18 ft., and small sanctuary. It is fitted with stained and varnished convertible seats and desks, suitable for school and chapel purposes. The architect of the buildings was Mr. William Ingram, Bath-street, Glasgow, and the contractors for the principal works were—Messrs. Brown & Henderson, Hamilton; Mr. Thom, Uddingston, and Messrs. M'Ewan & Savage, Glasgow.

Difficulties of the Historical Painter in a New Country.—At Washington the grand historic fresco designed to belt the rotunda of the Capitol has been brought to a stand in an unfinished state by an unforeseen obstacle. The artist who has the work in charge declares that "there isn't history enough to go round." The fresco begins with the landing of Christopher Columbus, and at present it finishes with scenes of the Mexican War. To take designs from the scenes in the recent Civil War would hardly be in good taste under the circumstances; the time has not yet come for the artistic commemoration of that great chapter in the annals of the United States, at least in the building where Congress meets. So a serious blank remains to be filled. An Emancipation panel has been suggested, but objections have been raised to this also. The indications at present are that the work will linger on till more history has been made.—*Furniture Gazette.*

Typhoid Fever and Rainfall.— In the last number of the *Archives Italiennes de Biologie* (tome iv., p. 26) is an interesting paper by Professor Louis Pagliani on the "Oscillations of Typhoid Fever in Paris," in relation to the quantity of rainfall and the conditions of sewage. He finds, from an examination of the weekly bulletins, that for the last three years a heavy rainfall is followed about two weeks later by an increase in the number of cases of typhoid reported as admitted to the hospital, and in about four or five weeks by an increase in the number of deaths from this cause. As the disease has a period of incubation of from one to two weeks, and, if fatal, is usually so in from the third to the fifth weeks, this coincidence, which he finds repeated several times, would seem to be something more than a mere chance occurrence. Professor Pagliani does not find that the same thing happens in other localities having a soil as impure as that of Paris, and therefore concludes that rainfall and filth are insufficient by themselves to develope the disease, and that the reason for the effects observed in Paris is connected with its system of sewerage, and more especially with the effects produced by heavy and rapid rainfall in gorging the main sewers and obstructing the flow of sewage proper from the houses, or even causing a reflux of foul water into the cellar. Many of the smaller sewers have very little fall, and are readily obstructed. The explanation is somewhat doubtful, but the fact seems established.—*Health.*

Notes on Coal.—The beds or seams of coal form but a small portion of the thickness of the great geological group of strata to which they for the most part appertain. This group is called the *carboniferous*, and not uncommonly "The Coal"; but even where coal is most abundant, it forms only a minute part of the whole mass. Thus it has been estimated, Sir Charles Lyell tells us, that in South Wales the thickness of the carboniferous strata amounts in all to between 11,000 ft. and 12,000 ft. (or more than two miles); "but the various coal-seams do not," according to Professor Phillips, "exceed in the aggregate 120 ft.," or little more than one-hundredth part of the whole. In North Lancashire the carboniferous strata occupy a depth of more than three and a half miles, with the same relative disproportion between the thickness of the coal-seams and that of the complete series of strata. Again, in Nova Scotia, the coal-bearing strata attain a thickness of more than three miles. Here no fewer than eighty seams of coal have been counted (seventy-one having been exposed by the action of the sea); but these seams are nowhere more than 5 ft. in thickness, and many are but a few inches thick. Thus it is evident that the formation of coal can have been in progress but for a short portion of the time during which the great carboniferous series of strata was in process of deposition. Throughout by far the greater portion of that time other minerals were being deposited.—*Mr. Richard A. Proctor, in "Knowledge."*

Large Sale of Building Land and Ground Rents on the Clapham Park Estate.—Last week, at the Auction Mart, Mr. G. Brinsley, of New Bridge-street, disposed of an extensive quantity of freehold building land and freehold ground-rents, forming a portion of the Clapham Park Estate, near Clapham Common, which is between 35 and 40 acres in extent. The property submitted at the sale covers an area of about nine acres, comprises thirteen plots of freehold building land with frontages to several new roads which have been made upon the estate. The sale also included several other plots of land which had been let to various builders upon building agreements for the erection of private dwelling-houses on the estate at ground rentals amounting in the whole to 424*l.* per annum; and likewise freehold ground-rents amounting to 395*l.* per annum, arising out of houses already built upon the estate. The sale took place under an order of the Court of Chancery in the case Nicholson *v.* Haynes. The whole of the several properties were submitted in one lot, and were sold for the sum of 25,000*l.*

National Art Training School, South Kensington. — The winter session of the National Art Training School at South Kensington will commence on Wednesday, the 1st of October. The first examination for the forthcoming session will be held on Tuesday, the 30th inst.

Public Library and Art Gallery for Auckland, New Zealand.—Some time ago the city authorities of Auckland invited designs from architects for a new public library and art-gallery for that city, adjoining the Albert Park, and the first premium of 200*l.* has been awarded to the design bearing the motto, "Literæ, Scientiæ, et Artes," from the twenty-seven designs sent in, which was prepared by Messrs. Grainger & D'Ebro, architects, of Melbourne. The style of architecture adopted is Early French Renaissance. The principal entrance is situated at the intersecting corner of the two streets, where there is a tower which, judging from a view given in the *Australasian Sketcher*, is the least satisfactory feature of the design. The whole of the building will be carried out in cut stone, with fireproof construction.

A New R.C. Ecclesiastical Seminary at Boston, U.S., is to be opened on the 22nd of this month. The architect of the new building (says the *Boston Pilot*) is Mr. J. H. Bassarick, and the estimated cost is 150,000 dollars (about 30,000*l.*) When finished it will be a quadrangular pile.

Builders' Ironmongery.—Mr. James Hill, of Queen Victoria-street, has just issued a useful price list of builders' ironmongery of a serviceable description. The price list and previous catalogues devoted to architects' specialities form a complete compendium of locks, door furniture, and general ironmongery.

Surrey Bells and London Bell-founders. A book with this title, by J. C. L. Stahlschmidt, is announced by Mr. Elliot Stock. The work is very fully illustrated by wood-cuts and *facsimiles*; it will furnish information concerning some of the early bell-founders which has not been hitherto published.

Hamilton (Glasgow). — The new Free Church in Hope-street, Hamilton, was formally opened on the 10th inst. The building is Gothic in character. The church internally is 50 ft. long by 42 ft. wide, divided by means of light iron columns into nave and aisles of four bays, each bay being lighted by a two-light window with tracery on the head. There is a gallery at the sides, two seats deep, and a larger gallery at the end extending over the entrance vestibule. At the farther extremity, within an arched recess, is placed a pulpit with canopy, and over all a large marigold window, filled in with stained glass by Messrs. Ballantyne, Edinburgh. The carpentry of the roof is all exposed to view, framed of pitch pine, varnished, and of its natural colour. The seats, with solid bench-ends, the doors, and other joiner work, are also of pitch pine, varnished. Instead of the usual wood lining round the church, which is so liable to rot, the walls are lined to a height of 4 ft. with a dado of red pressed bricks. The front elevation to Hope-street has, at the left-hand angle, a tower 17 ft. square, rising up to a height of 50 ft., provided with a deeply-recessed belfry window of two lights on each of the four sides, and crowned with a spire, rising to a total height of 138 ft. Adjoining the tower is the main gable. The walls are faced with square ragstone from the Lanark quarries, and with hewn freestone from Wishaw. Messrs. Martin & Symington, Carluke, were the masons; Archibald Millar, Motherwell, the joiner; Thomas Lithgow, slater and plasterer; James Wood, plumber; Robert Symington, painter—all of Lanark; Meikle & Sons, Glasgow, glaziers; Messrs. W. & J. Hay, Liverpool, architects; and Mr. William Cassels, Lanark, clerk of the works.

CONTRACTS AND PUBLIC APPOINTMENTS.

Epitome of Advertisements in this Number.

CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Public Library, &c.	Swansea Corporation...	H. Holtom	Sept. 22nd	ii.
Crane for Gateshead Quay	Gateshead Corporation	.....	Sept. 23rd	xviii.
Buckhurst Hill Drainage	Epping Union R. S. A.	Lewis Angell, C.E.	Sept. 25th	ii.
Drainage Works, &c. South Eastern Hospital, Deptford	Met. Asylums Board ...	Keith D. Young	do.	ii.
Hospital at Chaseville Park, Winchmore Hill	do.	Pennington & Bridgen	Sept. 26th	ii.
Enlargement of Station, Perth	Perth Gen. Statn. Com.	Blyth & Cunningham...	do.	ii.
Public Offices, and other Buildings	Widnes Local Board ...	F. & G. Holme	Sept. 29th	ii.
New Offices, Bewick-street, Newcastle	Tyne Improvment Com.	R. J. Johnson	Sept. 30th	ii.
Alterations, &c., Workhouse	Grdns. of Croydon Un.	Berney & Monday	do.	xviii.
Paving Works	Greenwich Bd. of Wks.	*Official*	October 1st	xviii.
Stone for Road-making	Wanstead Local Board	do.	October 2nd	ii.
Battery Drill Shed and Offices, Maryport	Admiralty	do.	October 3rd	ii.
Blue Guernsey Granite, &c.	Acton Local Board	do.	October 7th	ii.
Cast-Iron Pipes, Valves, &c.	Southampton Corprtn.	do.	October 14th	ii.
Extension to Laundry, Vauxhall	Not stated	B. Swinstead	Not stated	i.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Applications to be in.	Salary.	Page.
Surveyor	Northampton Cor.	Sept. 22nd	200*l.* per annum	xvi.
Surveyor and Inspector of Nuisances	Maldon Union R. S. A.	Sept. 29th	do.	xvi.

TENDERS.

For works of sewerage and water supply, for the Rural Sanitary Authority for the District of Petersfield. Mr. W. Barns Kinsey, engineer, Westminster:—

T. Hall, Portsmouth	£8,757	6	6
Bottoms Bros., Battersea	7,976	0	0
J. Crook, Northam	7,480	0	0
J. Poole, Gravesend	7,385	4	0
J. M'Kay, Southsea	7,118	17	3
Crook & Smith, Southampton	6,993	0	0
T. B. Hayter, Landport	6,740	0	0
B. Cooke & Co., Battersea	6,718	0	0
T. Adams, Moorgate-street	6,437	0	5
W. H. Dearle, Eastbourne (accepted)	5,860	0	0

For new premises on south side of Market-place, Leicester, for the Corporation. Messrs. Wheeler, Hollands, & James, architects, 119, Cheapside, E.C. Quantities by Messrs. Evans & Deacon:—

R. A. G. Barnett	£3,310	0	0
J. O. Jewsbey	3,241	0	0
C. Bass	3,175	0	0
J. C. Kellet & Sons	3,169	0	0
H. Bland	3,150	0	0
J. C. Tyers	3,100	0	0
A. Plant	3,086	0	0
C. Wright	3,059	0	0
F. Major	3,049	0	0
W. & H. Herbert	3,028	0	0
T. Duxbey & Sons, Northampton-street, Leicester (accepted)	3,000	0	0

For enlargement of the cemetery, for the Corporation of Southampton:—

J. Crook, Northam (accepted)	£2,237	10	0

[Two tenders received.]

For the erection of St. Barnabas's Church, Blackburn. Mr. William S. Varley, architect, Blackburn. Quantities by the architect:—

R. Ibbottson	£6,600	0	0
T. Fawcett	6,269	0	0
J. Fecitt	6,248	0	0
W. J. Woof, Cronshaw	6,110	0	0
B. Abbott & Son	6,100	0	0
Marshall & Dent (accepted)	6,098	0	0
W. & J. Arkwright	6,075	10	0
J. Whittaker	6,040	0	0
Kenyon & Moulding	6,037	0	0
T. Higson & Son	5,997	0	0

[All of Blackburn.]

For new factory at South-place, Euston-road, for Mr. U. G. Eavestaff. Messrs. Tolley & Son, architects:—

Faulkner	£977	0	0
Marriage	945	0	0
Lamble	869	0	0
Gould & Brand	837	0	0

For the erection of a sanitary hospital at Bournemouth, Hants, for the Bournemouth Commissioners:—

J. Crook, Northam, Southampton*	£2,687	12	9

* Accepted.

[Two tenders received.]

For the erection of gardener's lodge and outbuildings at Oak Lodge, Sevenoaks, Kent. Mr. H. Percy Monckton, architect, Great James-street, Bedford-row, W.C.:—

C. King, Sevenoaks (accepted)	£575	12	6

For the erection of a range of hot-houses at Oak Lodge, Sevenoaks, Kent. Mr. H. Percy Monckton, architect:—

Boulton & Paul, Norwich (accepted)	£315	10	0

For the erection of schools, with boundary walls, at Newhaven, for the Newhaven School Board. Mr. Geo. Fuller, architect, Lewes and Eastbourne. Quantities by Mr. J. C. Pike, Brighton :—

Rogers & Hubard, Eastbourne	£3,182	0	0
Chapman, Newhaven	2,890	0	0
Houghton, East Grinstead	2,848	0	0
Peters, Horsham	2,794	0	0
G. R. Lockyer, Brighton	2,768	0	0
J. Donovan & Son, Eastbourne	2,750	0	0
E. Cornwell & Son, Eastbourne	2,750	0	0
Woolger, Newhaven	2,690	0	0
Kemp, Brighton	2,679	0	0
Morling Bros., Seaford	2,650	0	0
Hall & Hunnisett, East Hoathly	2,624	0	0
Charlwood Bros., East Grinstead	2,590	0	0
Longley, Crawley	2,440	0	0
J. Reynolds, jun., Hove, Brighton*	2,249	0	0

* Accepted conditionally.

For alterations, &c., at the Brunswick Arms public-house, Old Kent-road. Messrs. Bird & Walters, architects :—

Gold	£1,859	0	0
Birch & Co.	1,817	0	0
Williams & Son	1,790	0	0
J. Anley	1,730	0	0
W. Shurmur	1,694	0	0
Stilling	1,399	9	0

For alterations to the Desborough Arms public-house, Harrow-road. Messrs. Bird & Walters, architects :—

F. Mark	£1,076	0	0
R. Marr	1,065	0	0
Jackson & Todd	1,049	0	0
W. Shurmur	990	0	0
Steel Bros.	978	0	0
Birch & Co.	977	0	0
C. Goad	975	0	0

For the erection of mission church, New-lane, Enfield. Mr. W. D. Church, architect :—

Mills	£1,477	0	0
T. Boyce	1,450	0	0
Staines & Son	1,399	0	0
W. Shurmur	1,386	0	0
Cook	1,295	0	0
Fairhead	1,285	0	0
Patman & Fotheringham	1,258	0	0
Tinson	1,184	0	0

For alterations at the Friend-at-Hand public-house, Russell-square. Messrs. Bird & Walters, architects :—

J. Anley	£990	0	0
W. Shurmur	989	0	0
Jackson & Todd	949	0	0
Steel Bros.	949	0	0
Birch & Co.	895	0	0
Yeo	865	0	0
Ridout	837	0	0

For alterations, &c., to the Pegasus public-house, Green-lanes, N. Mr. W. West, architect :—

Godden	£2,095	0	0
Spencer & Co.	1,850	0	0
Roach	1,750	0	0
Mills	1,626	0	0
W. Shurmur	1,566	0	0
Jackson & Todd	1,325	0	0

For residence and stabling, Monkton Combe, near Bath, for Mr. W. Vaughan Jenkins. Mr. George Rhodes, architect. Quantities supplied by Mr. F. Warburton Stent :—

J. R. Hunt, Bow	£4,190	0	0
Pack Bros., Brixton	4,578	0	0
Bladwill & Parsons, Bath	4,150	0	0
Macey & Sons, London	4,155	0	0
[Surveyor's estimate £3,953	0	0]	

Accepted for additions to stables, &c., at Fern Lodge, Orpington, with extra works to the house. Mr. St. Pierre Harris, architect :—

W. & F. Croaker	£339	0	0

[No competition.]

For repairs and alterations to Inchcape, Chislehurst, for Mr. L. Fry. Mr. St. Pierre Harris, architect :—

Horrocks, Croydon	£134	0	0
Wood, Chislehurst*	109	0	0

* Accepted, not including easements.

For rebuilding premises, No. 357, Wandsworth-road, S.W., for Mr. F. S. Schuller. Mr. H. S. Woodcock, surveyor :—

Lathey Bros.	£565	0	0
Mallet	555	0	0
Holloway Bros. (accepted)	531	0	0

Accepted for sundry alterations to twelve houses in the Lansdowne-road, E., for Mr. T. W. Rhodes. Mr. J. H. Jones, architect :—

J. Jarvis & Sons	£1,680	0	0

For sundry works at No. 6, Cowcross-street, E.C., for W. Robinson & Son. Mr. C. Aubrey, architect :—

Thomson & Son	£104	10	0
J. Jarvis & Son (accepted)	75	0	0
Thompson	69	0	0

For sundry alterations to the Baxendale Arms, Columbia-road, E., for Mr. C. Lea :—

Gibson	£297	0	0
J. Jarvis & Sons (accepted)	295	0	0

Accepted for fitting coffee-house, No. 364, Bethnal Green-road, E., for Mrs. E. Young :—

J. Jarvis & Sons	£220	0	0

Accepted for enlarging carpet department, for Messrs. C. & R. Light, Curtain-road. Mr. R. Creese Harrison, architect :—

J. Jarvis & Sons	£130	0	0

For additions to house, Dapdune-crescent, Woodbridge-road, Guildford. Messrs. Peak, Lunn, and Peak, architects, Guildford :—

Strudwick, Guildford	£238	0	0
Nye, Guildford (accepted)	215	0	0

Accepted for the erection of a house and small stable on the Artillery Field Estate, Guildford, for Mr. A. Lucas. Messrs. Peak, Lunn, & Peak, architects :—

R. Downes, Guildford (Excavator, Bricklayer, &c.)	£321	15	0
Hill & Son, Guildford (Carpenter, Smith, &c.)	230	0	0

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E. R.—A. W. C. (send drawings).—A. B.—E. B. B.—R. A. B.—Old Subscriber.—W. C. T.—Bombazine (will reply).—W. T. (below our mark).

All statements of facts, lists of tenders, &c., must be accompanied by the name and address of the sender, not necessarily for publication.

We are compelled to decline pointing out books and giving addresses.

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Letters or communications (beyond mere news-items) which have been duplicated for other journals, are NOT DESIRED.

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Addressed to No. 46, Catherine-street, W.C.

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Asphalte.
Seyssel, Patent Metallic Lava, and White Asphaltes.
M. STODART & CO.
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